THE IRON AGE

A Review of the Hardware, Iron, Machinery and Metal Trades.

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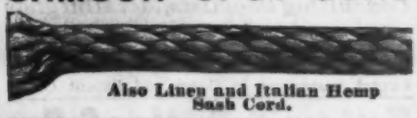

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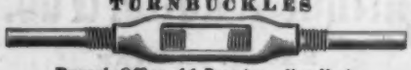

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Adv. on Page 16

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THE IRON AGE

New York, Thursday, December 13, 1906.

The Colburn 42-inch Boring Mill.

The essential requirements of a vertical boring mill capable of using high speed steel under the most exacting conditions of modern shop practice are extreme rigidity throughout, ample power, exact alignment and ease and convenience of operation. These are claimed to be features of the 42-in. boring and turning mill built by the Colburn Machine Tool Company, Franklin, Pa., and shown in the accompanying illustrations. Fig. 1 shows the machine equipped with one plain swiveling head and one turret head, but it is also made with two plain swiveling heads. Fig. 2 is a rear view. The rams are massive, the swivels and saddles large, the cross rail of box girder type generously proportioned and strongly ribbed with large arched back between the housings, the table heavy, the top brace deep and the housings wide faced, giving ample bearing surface for the crossrail.

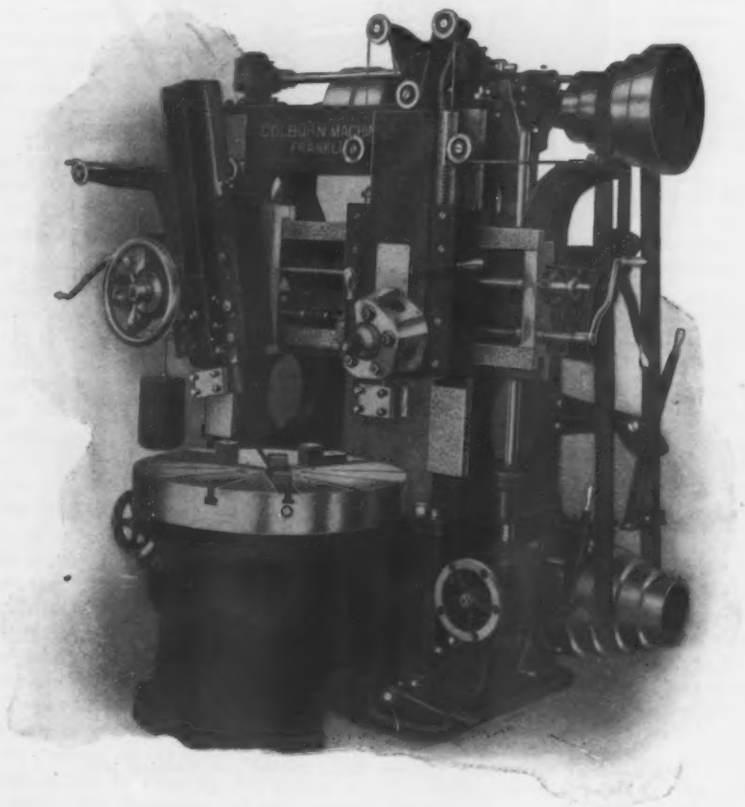


Fig. 1.—The Colburn 42-In. Boring and Turning Mill with One Plain Swivel Head and One Fixed Turret Head.

On a large variety of work vertical mills are replacing engine lathes for the reason that a job can be much more easily and conveniently held on a horizontal table. No effort is required to keep it there prior to the actual cutting, while on the face plate of a lathe the work must be clamped in place before being left. Work may be easily chucked, and better and faster work done as the drill or boring bar operates in a vertical position, and the cuttings drop away from it with much less chance to clog the tool. Very often two heads may be used at one time and heavier cuts taken at fast speeds. The heads of this mill are operated independently of each other in all directions. There are 10 changes of feed for each head, varying from 0.03 to 0.7 in. horizontally, and from 0.015 to 0.35 in. in vertical or angular directions. The work capacity is for a diameter of 43 in. and a hight of 33 in. under the crossrail and 37 in. under the turret. A combination three or four jawed chuck or plain table is furnished as desired. Interlocking teeth are milled in both jaw and slide of chucks to prevent any possibility of the jaws slipping when under extreme pressure.

A unique safety device is provided for each head to prevent the breakage of gears in case the heads are accidentally allowed to run together or against the center stop. A shifter for mechanically shifting the cone pulley belt from one step of the cone to another is provided, and the driving belt may be shifted from the tight to the loose pulley on the countershaft from either side of the machine.

The loose pulley is slightly smaller than the tight pulley to take the strain from the bearings when the mill is not revolving. A narrow flange between the two pulleys allows the belt to easily mount or descend, thereby enabling the operator to start or stop the machine with ease.

The headstock or driving mechanism is self-contained, and is mounted within the bed of the machine entirely out of the way, but is at the same time very accessible. All of the gears run in a bath of oil. There are 10 changes of table speed in geometrical progression from 3 to 61 rev. per min. Lubrication of all the bearings throughout the machine is given special attention. The crossrail is raised or lowered by a worm and worm wheel located in dustproof cases on top of the housings. This is considered by the maker preferable to the customary method of using exposed bevel gears. A steel tiller rope carries the counterweight. This insures smoother movement of the heads than is possible with a chain. All gears in the driving and feeding mechanism and on the end of the crossrail are encased. The possibility of breaking or injuring the teeth of the ram racks is reduced to a minimum, as inserted steel racks are used.

The turret head mill is provided with an inclined five-sided turret, which permits the turret slide being made much thicker and stiffer than is possible with the

straight turret. The tool holders are made from solid steel forgings.

A large number of steel gears are employed throughout the mill, and all gears which are not steel are made from iron of a special composition, which the Colburn Machine Tool Company claims to be 40 per cent. stronger than the ordinary cast iron gears used on machine tools.

The table is driven by a steel spur pinion, the ratio of gearing in the driving mechanism with back gears being 73 to 1. The table spindle has a large annular bearing at the top and two straight vertical bearings. The annular bearing makes it self-centering, and its own weight, as well as that of the table and the load, has a tendency to maintain its perfect alignment. A special automatic lubricating device is provided, and the spindle always rides on a thin film of oil.

This mill is provided with a friction brake, which is operated by a treadle placed within easy reach of the operator at the front of the machine. Acting directly upon the prime mover, all shock and jar is eliminated, and the table brought to a dead stop instantly in any desired position. A thread cutting attachment for cutting all standard threads from 4 to 14 per inch, including 11½, can be attached to the right hand head.

This machine may be driven by either a constant or variable speed motor without changing the construction, and the motor may be attached at any time. The net weight of the machine is 11,000 lb. The 42-in. mill is one of the seven sizes built by this company, the others being 30, 48, 53, 60 and 72 in., respectively.

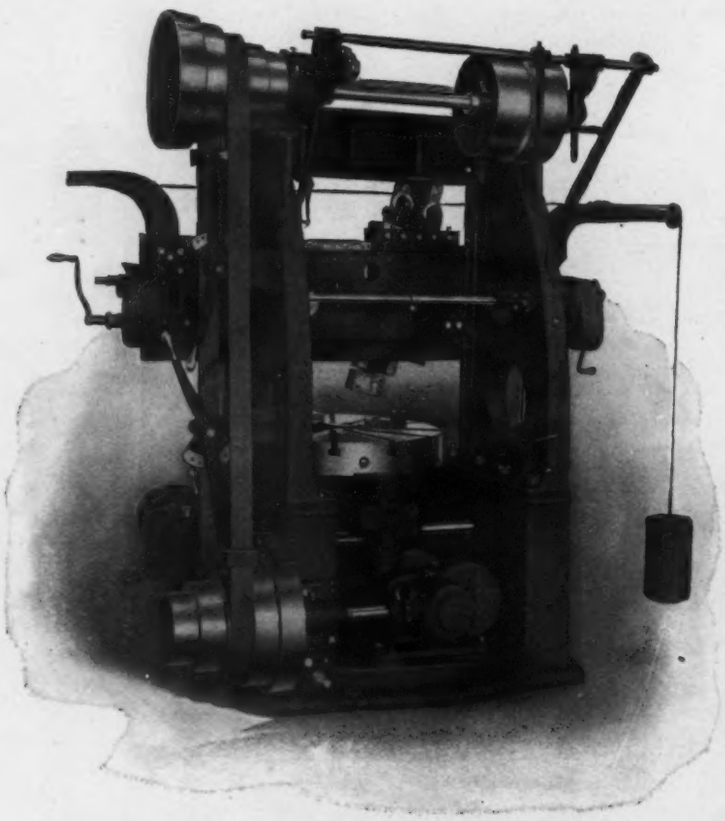


Fig. 2.—Rear View of the Colburn 42-In. Boring and Turning Mill.

Steam Boiler Construction.—Secretary Joseph B. Pierce of the Hartford Steam Boiler Inspection & Insurance Company is quoted as follows in an Associated Press dispatch: "Probably nine-tenths of the boilers in use in the United States have lapped seams, although the more modern boilers built for high pressures are equipped with triple or quadruple butt strap seams. In constructing a boiler of the latter pattern the bent plates are set edge to edge and the straps are riveted to the outside and then the inside, with either three or four rows of rivets on each side, making a total of six or eight rows of rivets. By this construction there is no strain on the plates, and they retain their natural curves. When a lapped seam boiler is made the plates are forced to lap each other and, of necessity, they are bent somewhat from their perfect curves, though the boiler as a whole is almost a complete circle around the outside. The cause of the Brockton disaster, several years ago, was that the boiler, which had a lapped seam shell, was cracked on the inside of the lap, where it was impossible for an inspector to discover the weakness without taking the plates apart, and, of course, this would be out of the question."

Tracing Cloth Now Made in America.

Our readers will be interested in the fact that tracing cloth is now being manufactured in the United States. The domestic product is claimed to be equal in every respect to the imported cloth, having all the qualities a perfect tracing cloth should have.

The domestic tracing cloth is made by the American Tracing Cloth Company, having its offices at 11 Broadway, New York City, while the plant is located at Paterson, N. J. The cloth is sold under the name of Peerless. The company is believed to have accomplished quite a feat in succeeding in the manufacture of tracing cloth in this country, as many have tried to do so, but have not succeeded in producing a marketable article on account of unfavorable climatic conditions characteristic of this country which they could not overcome.

The American Tracing Cloth Company has, however, succeeded in creating the conditions necessary for the manufacture of tracing cloth by special means which they guard carefully. It was also necessary specially to design the machinery with which tracing cloth may be made here, and the company holds several strong patents on these designs. The credit of discovering the process is due to a graduate of a German university, who is very prominent in his profession, while the machinery was designed by an experienced man who has had a long and successful career in textile work.

Strong financial interests are stated to be backing the company, and the managers are quite confident that their product will in time replace the imported article, when the consumer has found out that he can purchase a perfect tracing cloth made in this country and at a cheaper price.

The Armor Plate Contracts.

The Annual Report of Secretary Bonaparte.

WASHINGTON, D. C., December 11, 1906.—Secretary of the Navy Bonaparte, in his annual report just transmitted to the President, devotes an interesting chapter to an account of the Department's recent negotiations with the armor plate manufacturers. In part he says:

The Contracts for Armor Plate.

"The Department was subjected to much criticism in the press and elsewhere by reason of its action on the bids for armor plate submitted by three corporations—the only three in the country engaged in its manufacture—in July last. Two of these companies, the Carnegie and the Bethlehem, had on several previous occasions submitted identical bids for such armor, and it was generally believed, probably with reason, that an understanding or agreement existed between them to do this.

"This year each company submitted an independent bid, those of the Carnegie and Bethlehem companies being both considerably less than any offer either company had ever previously made, but the Midvale Company underbid both of them, so as to make its offer for the bulk of the contract $345 per ton, a lower price than has ever been paid by this Government for armor plate, and, according to the information of the Department, considerably less than is paid by any foreign government. I determined to give the Midvale Company one-half of the contract and to give one-fourth to each of the other two, provided they would reduce their bids to the figures fixed by the Midvale Company; if either of them refused to do this the Midvale Company was to get the share of the one so refusing as well as its own.

A Single Source of Supply Deprecated.

"In reaching this conclusion I was influenced partly by the fact that the Midvale Company was a little behind in its deliveries under previous contracts; but mainly by the probability that if no work were given to the old companies—since the Government was their only customer and they would soon complete their deliveries under contracts already given out—they would transform their plants for the production of armor plate and devote them to other products for which there is a commercial demand, thus reducing the facilities for the production of an article essential to the national defense and leaving the Government no source of supply except the Midvale Company. The conditions of the Department were accepted by all three companies and the contract was thus divided, the transaction being on the whole the most favorable one of this character ever made by the Government.

"The criticism to which this action of the Department was subjected seemed to rest upon a theory that it was the duty of the Department to injure and, if possible, break up the business of the two older companies as a punishment for their refusal to compete against each other and alleged combination to keep up the prices of their product in the past. No discussion of the merits of such criticism seems to me needful or appropriate, but the incident may well serve to call attention to the necessity for furnishing the Department with some effective means of defense against such combinations among producers. When there are only two or three of the latter in the whole country and the Government is the only purchaser for their product it is obvious that combinations are almost inevitable, and the Department ought evidently to be given a weapon to use under such circumstances.

How to Control the Situation.

"There are only two ways in which it is practicable to control such a situation; either the Government must be authorized to manufacture its own armor plate or it must be permitted to buy this abroad. I recommend that both privileges be accorded to the Department. The first mentioned of them would be, however, probably ineffectual, since not only would the cost of establishing a Government plant greatly exceed any difference in the price of the product which could be obtained in a single year, but the delay attendant upon the establishment of such a manufactory would be very objectionable and might involve expensive complications with the contractors building the ships on which the armor would be used, and finally, experience has shown that there are serious drawbacks to the permanent operation of a plant of this character by the Government.

"If, however, the Secretary of the Navy were authorized to buy armor plate abroad whenever, in the judgment of the President, the price at which he could obtain such armor plate in the United States was exorbitant or unreasonable, there is good reason to believe that the manufacturers would either not form a combination at all or agree upon a reasonable and moderate price. I would extend the like authority to the purchase of torpedoes, ammunition, projectiles, and in fact, all articles necessary to the national defense. It is evident that such articles stand on a totally different footing from such as are manufactured only for private consumption. The Government has the constitutional right, a right inherent in its sovereignty, to take, by the exercise of its power of eminent domain, any article necessary to the national defense and already in existence, upon paying for it a reasonable price.

"When citizens of the United States, enjoying the protection of its laws, who are engaged in the manufacture of articles of this character, refuse to manufacture them for the Government unless it shall agree to pay for them an exorbitant and unreasonable price, they evidently defraud it of an opportunity to exercise its just constitutional powers and evade the fulfillment of their own duties as patriotic citizens. Therefore, whatever may be the general economic policy of the Government, the markets of the world ought to be open to it in dealing with the situation thus created."

A Liberal Naval Programme.

In his last annual report the Secretary stated that the aggregate of our battleships and other vessels building or authorized seemed sufficient to provide for any contingencies within the limit of probability. He has since reached a definite conclusion and referring to the programme for the increase of the navy embodied in his report he says:

"Without going into detailed explanations, which are needless and might be objectionable, it is my duty now to report to you and to the Congress that, in my judgment, circumstances have so far changed as to make provision for a moderate increase in the effective fighting strength of our navy the part of patriotic foresight at present. I recommend, therefore, that, as soon as may be practicable at this session the Congress authorize the construction of a sister ship to the one already authorized and of which the plans are now submitted; so that, by simply duplicating these plans and the further detailed specifications and drawings by which they are to be supplemented, we can have two vessels of this class completed within the time which would otherwise be needed for the construction of only one."

In this connection the Secretary submits the programme recommended by the General Board and the Board on Construction, as follows:

General Board: Two battleships, $20,000,000; 2 scout cruisers, $5,000,000; 4 destroyers, $3,400,000; 4 ship's motor torpedo boats, $120,000; 1 river gunboat of Helena size, $600,000; 2 small gunboats, $50,000; 2 shallow draft gunboats, $160,000; 2 squadron colliers, $2,500,000; 1 ammunition vessel to carry 5000 tons dead weight, to have same speed as squadron colliers; approximate total, $33,080,000.

Board on Construction: Two battleships, $19,000,000; 2 scout cruisers, $4,000,000; 4 destroyers, $3,200,000; 2 squadron colliers, $4,000,000; 1 river gunboat of Helena type, $600,000; 2 shallow draft river gunboats, $200,000; total, $31,000,000.

Commenting on these programmes, the Secretary says:

"The two boards differ as to the size of the scout cruisers recommended, the General Board holding that vessels of this type should be considerably larger than the three scouts now building, while the Board on Construction advises that we simply build two more of this class. In view of this difference of opinion between the boards and of the fact that the scout cruisers now building are in a sense experimental, and that a very much better judgment as to desirable characteristics of this class of vessels can be formed after their completion and trial, I do not recommend the authorization of any scout cruisers at this session of Congress." W. L. C.

TOOL STEEL AND ITS TREATMENT.*

Among modern experiments upon the chemical composition and the heat treatment of tools with relation to their cutting speeds, the experiments made by the firm of Armstrong, Whitworth & Co., the celebrated ship, cannon and machine builders of England, would seem to rank in thoroughness next to those made by Mr. White and the writer at the Bethlehem Steel Works. Or it would be more correct to say that no other published experiments have come to the writer's attention which appear to him to have been so carefully conducted. In a paper entitled "The Development and Use of High Speed Tool Steel" (published in the *Journal* of the Iron and Steel Institute, October, 1904),† J. M. Gledhill, managing director of Armstrong, Whitworth & Co., has given a brief account of these experiments. The opening paragraphs of this paper present such a concise and interesting historical sketch of the development of tool steel and its treatment that the writer takes the liberty of quoting from them as follows:

Wootz steel fabricated in India centuries ago was crucible steel, as was also the celebrated Damascus steel produced at the forges of Toledo. Curiously, this latter steel furnishes yet another proof that there is nothing new under the sun, for it is recorded that Damascus steel contained certain percentages of tungsten, nickel, manganese, &c., some of the very elements, in fact, contained in the present modern high speed steel, so that a latent high speed steel may be said to have existed centuries ago, and all that was necessary to bring out its inherent powers would have been the heating of it in a paradoxical manner, so to speak; that is, to such a high degree of temperature as was long thought would impair or destroy the nature of such steel. When, therefore, we look back on the period for which crucible steel has been known in the world's history, some may not unnaturally think that there has been time enough to have fully fathomed its mysteries, leaving little more to be said on the subject. It is, then, all the more remarkable that a discovery made but a few years back, and which has since revolutionized the treatment of crucible tool steel, should have remained so long a hidden secret.

A very important advance was made 30 or 40 years ago, when Mushet, or self-hardening steel, was introduced. This was the valuable invention of Robert Mushet, who after a long series of experiments, made while he was manager of the Titanic Steel Company, succeeded in producing a tungsten steel, and its introduction was a great advancement on the cutting powers of ordinary crucible steel, and for many years Mushet steel held a foremost place among tool steels.

It is now to America, however, that all honor must be given for the next great step in having set the pace and led the way in the present remarkable advancement in tool steel, and the author would here like to record that the greatest credit is due to Messrs. Taylor and White, who at the Bethlehem Steel Works of America initiated high-speed cutting, and at the exhibit of their firm in Paris, some years back, what were then considered to be astonishing results in speeds of cutting steel were publicly demonstrated. Since then still greater developments have been made by the author's firm in high-speed steels, and with increased experience in its manufacture, treatment and application in our workshops, results in cutting powers far beyond expectation have been attained.

Ordinary Tool Steel.

For centuries steel weapons, knives, tools and implements used in cutting metals have been made from tool steel, which in its chemical composition consists mainly of the two elements of iron and carbon—carbon to the extent of, say, from ¾ of 1 per cent. to 1½ per cent.—and the rest of the steel consists practically of iron. In addition to these two elements, however, tool steel has contained in small quantities several other ingredients, among which manganese and silicon may be classified as useful elements—*i. e.*, elements which facilitate melting and forging, and which by their presence improve the properties of the steel in its finished state. In addition to these elements very small percentages of phosphorus and sulphur are always present. These latter may be described or classified as impurities. Phosphorus is particularly injurious, as it causes brittleness in the finished steel, known as cold shortness. Sulphur renders the steel difficult to work while hot, and this is known as red shortness. This tool steel, which has been in use for centuries past and which broadly speaking consists mainly of a combination of carbon and iron, is now known as carbon tool steel or ordinary tool steel.

Tools and implements made from this steel, however, are entirely too soft, as they come from the forge, for almost all cutting purposes. To prepare them for cutting they must be hardened, and this is done by heating them to temperatures in accordance with their carbon contents, varying between a dark and a bright cherry red, say, from 1350 degrees F. (735 degrees C.) up to 1550 degrees F. (845 degrees C.), and then, by plunging them quickly into water or other suitable bath, cooling them very rapidly to a temperature not exceeding 392 degrees F. (200 degrees C.), or preferably to the normal temperature of the air. This operation is called hardening.

When cooled suddenly in this way implements and tools made from carbon tool steel are too brittle for most cutting purposes. This quality of brittleness is removed or modified by reheating to temperatures ranging between 392 degrees F. (200 degrees C.) and 600 degrees F. (315 degrees C.). The higher the tool is reheated within these ranges of temperature the softer it becomes, and this reheating for the purpose of partially softening and at the same time toughening the tool is the operation known as tempering the tool.

Difficulties in Hardening and Tempering.

The two operations of hardening and tempering implements made from tool steel are by no means simple. They have been the subject of a vast amount of experimenting and investigation for many years and in themselves constitute whole trades. The chief difficulties in hardening come from three causes:

A. Each ordinary tool steel, depending upon its chemical composition, has a particular temperature at which a radical change takes place in the condition of the carbon which is contained in it. This temperature, known as the refining point, critical point or point of recalescence of the steel, will be briefly referred to later in the paper. To obtain the best results in hardening the steel should be uniformly heated to slightly above this critical point. If heated below the critical point it fails to harden when plunged into water. On the other hand, the higher the temperature to which it is heated above the critical point the coarser will be the grain, with increased weakness and brittleness, after being plunged into water. This overheating of carbon steel tools to temperatures too high above the critical point has been in the past perhaps the most frequent cause of their failure. Hence the difficulty in judging the critical point for heating tools presents one of the most serious problems in hardening.

B. The second difficulty lies in not heating the tools uniformly. A lack of uniformity in heating will produce irregularity in the degree to which the tool is hardened, some portions being much harder than others after cooling also produces severe internal strains, often re the tool, frequently developing into water cracks.

C. The third difficulty lies in properly cooling the tool in the water or quenching medium. Uneven or irregular cooling also produces severe internal strains often resulting in water cracks.

The correct tempering of tools presents also many difficulties. In most cases it is desirable to temper tools or implements so that the cutting portion shall remain exceedingly hard while the body is softened, and thereby made sufficiently tough to give it the required strength. This necessary combination of toughness and hardness calls for great skill and judgment in the reheating or softening operation known as tempering. One of the greatest advantages of modern high speed tools over the carbon tools lies in the fact that they require far less knowledge and skill in their heat treatment than was demanded by the carbon tools. This will be indicated later in the paper.

Mushet or Self-Hardening Steel.

Some time between 1860 and 1870 Robert Mushet of the Titanic Steel Company, in England, made the discovery that if a considerable amount of tungsten was added to tool steel, in combination with a larger percentage of manganese than had been before used, the presence of

* From "The Art of Cutting Metals," by Fred W. Taylor, Philadelphia.

† Also presented in *The Iron Age* November 3 and 10, 1904.

these two elements with carbon in the steel produced the curious effect of causing the tool to be almost as hard when cooled slowly in air from a forging heat as carbon tools when cooled in water. Because of this peculiar property the Mushet tools were called in England self-hardening tools, and later in this country air hardening tools.

There are four epochs in the history of steel tools—namely, (1) The carbon tool steel era; (2) self-hardening steel era; (3) discovery of high speed tools; (4) modern high speed tools. We give below the chemical analyses of four tools, which are typical of these various steps or eras, in the development of metal cutting tools:

	Jessop. Per cent.	Mushet self-hardening. Per cent.	Original Taylor-White. Per cent.	Best modern high speed. 1906. Per cent.
Tungsten	...	5.441	8.00	18.91
Chromium	0.207	0.398	3.80	5.47
Carbon	1.047	0.15	1.85	0.67
Manganese	0.189	1.578	0.30	0.11
Vanadium	...	....	...	0.29
Silicon	0.206	1.044	0.15	0.043
Phosphorus	0.017	....	0.025	...
Sulphur	0.017	....	0.030	...
Speed per minute in feet, cutting medium steel	16	26	58 to 61	99

The first of these is the analysis of perhaps the most noted brand of ordinary carbon steel, that made by Jessop & Sons of England, which is typical of the era of carbon tools. The second is the analysis of the old fashioned Mushet self-hardening steel, as experimented with by us in 1894-1895—typical of the era of self-hardening tools. The third is the analysis of the steel recommended by us in our patent No. 668270 of February 19, 1901, as being on the whole the best at the time when modern high speed tools were invented by Mr. White and the writer, marking the beginning of high speed or red hardened tools. The fourth is the analysis of the best high speed tool, so far as we know, which has been developed up to the end of the summer of 1906.

For many years the tool steel developed by Mushet was looked upon largely as a curiosity. Gradually, however, the managers of machine shops found that by using tools made from the Mushet steel they were able to cut hard forgings and castings which were difficult to cut with the carbon tools. When this knowledge became quite general it was usual for the best machine shops to have a few Mushet tools on hand for use on specially difficult work, and their use for this purpose grew steadily from year to year. It was not, however, until about 1890 that there was at all a general awakening among managers of machine shops as to the whole question of the cutting speeds of tools, and it may be said that practically up to that time Mushet tools had not been used for the purpose of gaining an increase in cutting speed. In fact, up to the time of our experiments of 1894-1895 but few machines, if any, had had their driving speeds increased with a view to using the possible gain in cutting speed obtainable through Mushet or other self-hardening tools.

Experiments Comparing Mushet and Other Self-Hardening and Carbon Tools.

It was in 1894 that we first had the opportunity to make a careful series of experiments to determine the relative cutting speeds of the Mushet and the carbon tools. We had hitherto been prevented from doing so by the fact that the Midvale Steel Works manufactured and sold tool steel, and up to the time the writer left the company's employ it had not gone into the manufacture of self-hardening steel, and therefore would not allow us to make any experiments with it. Our experiments in 1894-1895 resulted in the following important discoveries:

a. That, comparing the self-hardening steel with carbon steel, a gain in speed of 41 per cent. to 47 per cent. could be made in cutting a hard forging of about the quality of tire steel; whereas a gain of nearly 90 per cent. could be made in cutting the softer qualities of metal; and

b. That by using a heavy stream of water on the nose of a Mushet or other self-hardening tool a gain of about 30 per cent. could be made in the cutting speed.

These experiments, then, indicated clearly that the use of Mushet steel almost exclusively for cutting exceedingly hard pieces of metal was the wrong one, since an enormously greater percentage of soft metal was cut in the average machine shop than of hard metal, and the gain in cutting soft metals was 90 per cent., as against only a 45 per cent. gain for hard. It thus became evident that instead of using self-hardening tools only occasionally for cutting extra hard pieces of metal they should be used daily throughout the shop on all ordinary work in place of the carbon steel tools. From that time on the increase in the use of self-hardening steels was so very great that at the time of our invention of the new high speed tools, probably from one-fourth to one-fifth of the roughing tools used in good machine shops had come to be made from self-hardening steel.

Between 1885 and 1895 a few manufacturers of tool steel started to imitate the Mushet steel, and in the latter part of this period it was discovered that by substituting chromium for manganese in combination with tungsten a good self-hardening or air hardening tool could be made. After 1890 the competition in the manufacture of self-hardening tool steels grew much more keen, but it is a remarkable fact that the successors to Mushet in the tool steel business, even up to the time of the Taylor-White invention, probably retained one-half of the business in self-hardening tool steel throughout the world. This is an unusual record for any one firm in the manufacture of any standard article.

At the time that we discovered the beneficial results from heating chromium-tungsten tools near to the melting point tools made by several makers of tool steel, containing largely chromium and tungsten as the self-hardening elements in place of the manganese and tungsten used by Mushet, had equaled in cutting speed the Mushet self-hardening tools.

Up to 1894 may be called the era of carbon tools. From 1894 to 1900, when high speed cutting tools treated by the Taylor-White process were exhibited at the Paris Exhibition, may be called the era of Mushet or self-hardening roughing tools. From 1900 up to the present time may be called the era of high speed tools, and this has become so completely the case that at the present time a carbon or an untreated tungsten-manganese or tungsten-chromium roughing tool can scarcely be found in an up to date machine shop.

Nature of the Invention of Modern High Speed Tools.

There exists in the minds of most users of modern high speed tools a serious misapprehension, both as to the nature of their invention and also as to that property in high speed tools, which chiefly gives them their value. Perhaps at least four out of five writers upon the subject of high speed tools speak of the discovery or introduction of high speed tool steels as though our invention consisted in the discovery of a tool steel new in its chemical composition. The fact is, however, that tool steel of excellent quality for making high speed tools existed and was in common use several years before our discovery was made.

A second misapprehension exists on the part of most people as to the nature of that property which enables the high speed tools to be run at their high speeds. Heating these tools (in a revolutionary manner) up close to their melting point is quite commonly referred to by writers on this subject as hardening the tools. In point of fact the high speed tools at their very hardest are little, if any, harder than the carbon tools, or the old fashioned self-hardening tools, and the quality of hardness is not that which enables them to run at very high speed.

Heating chromium-tungsten tools close to the melting point does not give them a degree of hardness which is unusual in tools, but it does give them the entirely new and extraordinary property of retaining what hardness they have, even after the tool has been heated up in use through the pressure and friction of the chip until it is almost or quite red hot. This new property in high speed tools has been very appropriately named "red hardness," because the tool maintains its cutting edge sufficiently sharp and hard to cut steel even after its nose is red hot, and because in many cases it heats up the chip or shaving which it is cutting until the portions of the chip which are exposed to the friction of the tool become red hot.

Hardness of the kind to which we have been accustomed in ordinary tools has but little to do with high speed tools. One of the high speed tools of the most approved chemical composition was run at as high a cutting speed as the high speed cutting tools originally developed by us. After running at its high speed two deep indentations or nicks were filed with a file made from ordinary carbon tool steel, one across the cutting edge and the other about ½ in. below the cutting edge, showing that a first-class high speed tool can be readily filed by the old carbon tool steel.

As to our invention, briefly speaking, by far the most important of the several discoveries made by us and which led to the modern high speed tools, was the discovery that when tools made from steel old in its chemical composition (containing not less than ½ of 1 per cent. of chromium and not less than 1 per cent. of tungsten, or its equivalent) were treated in a new and completely revolutionary manner to an extraordinarily high heat (a heat so high that it would have utterly ruined ordinary tools), this treatment imparted an entirely new quality or property to a cutting tool—namely, the property called "red hardened"—and it is this new property which enables these tools to run at their high cutting speeds.

General Comparison of the Ingredients of Tools.

Chemically speaking, the era of carbon tool steel may be said to consist of tools containing from ¾ to 1½ per cent. of carbon in combination with a little manganese and silicon (used to help in melting, casting and hammering the steel), the rest of the steel being iron.

The era of self-hardening tools may be said to consist of about 4 to 11 per cent. of tungsten in combination with 1½ to 3½ per cent. of manganese, with 1¼ to 2¼ per cent. of carbon, and to these ingredients chromium to the extent of from 3-10 of 1 per cent. to almost 3 per cent. was used either as a substitute for the manganese or in addition to it. The rest of the steel consisted of iron with a small amount of silicon used for melting purposes.

The era of high speed tool steel may be said to consist of tools containing ½ of 1 per cent. or more of chromium in combination with 1 per cent. or more of tungsten, or its equivalent of molybdenum heated almost to the melting point. The percentages of chromium and tungsten used in high speed tools vary between extremely wide limits. The "½ per cent. or more" of chromium referred to in our patent has been increased in the extreme case to the extent of 7 per cent. and the "1 per cent. or more" of tungsten has been increased in the extreme case to 26 per cent. The percentage of carbon, on the other hand, has been lowered until the better modern tool steels contain from 55-100 of 1 per cent. to about 1¼ per cent. as the maximum, and the manganese, silicon and other ingredients have been reduced to quantities sufficient merely for good melting. As above explained, molbydenum has been substituted for the tungsten as an equivalent or mixed with the tungsten. Our experiements, however, would indicate that this element is not as desirable as tungsten.

During the year 1906 our experiments indicate that the addition of a small amount of vanadium, from 25-100 of 1 per cent. to ½ of 1 per cent., chemically improves the quality of high speed tools, and the best chemical composition which we know of for high speed tools is the following, recently developed by us: Tungsten, per cent., 18.91; chromium, 5.47; carbon, 0.67; manganese, 0.11; vanadium, 0.29; silicon, 0.043.

Seven years have now gone by since Mr. White and the writer applied for our patents covering the Taylor-White process of making and treating tools, and it is an extraordinary fact that, so far as the writer knows, not a single improvement has been made upon the method of heat treatment for producing the high speed lathe and planer and other metal cutting tools therein described.

During the summer and fall of the present year (1906) we have procured those makes of tool steel which have recently attained the highest reputation for efficiency in England, Germany and America, and have conducted a careful series of experiments with tools shaped and ground exactly alike, in cutting both steel and cast iron of uniform qualities, in order to determine both what chemical composition and what heat treatment would produce a tool of the highest cutting speed. In all cases we obtained detailed instructions from the makers of the steels, telling us just what heat treatment to give tools made from their steels, and in some cases men were sent by the manufacturers to superintend the heat treatment of their tools. In all instances we treated each brand of tool steel exactly as directed and then tested the tools to determine their fastest standard cutting speeds.

In addition to this, similar tools, in most cases the same, made from each make of tool steel, were treated in exact accordance with the method indicated in our patent No. 668,269 of February 19, 1901, as our preferred method. And without an exception the same make of tools, when treated in exact accordance with the directions given in our patent, proved more uniform and ran at slightly higher cutting speeds than when treated in accordance with the directions given by the makers. This result is extraordinary, indeed we believe almost unique, in the history of an invention so fundamental and revolutionary in its character. Moreover, the writer must confess to the greatest surprise that, although subject to innumerable experiments throughout the entire manufacturing world, the method of treating these tools should not have been radically improved during all these years. Since in past years there has been difficulty at times in obtaining copies of our patent from the Patent Office we will briefly recapitulate the most important directions for treating modern high speed tools:

First or High Heat Treatment for High Speed Tools.

After the lathe or planer tool has been forged the entire nose of the tool should be slowly and uniformly preheated to a bright cherry red, allowing plenty of time so that the heat may penetrate thoroughly to the center of the tool and thus avoid danger of cracking from too rapid heating. From the bright cherry red up to the melting point, on the other hand, the tool should be heated as rapidly as practicable in an intensely hot fire until the nose begins to soften. In fact, if the extreme exposed portions of the nose are slightly fused no harm will be done. In this operation also thorough and uniform heating is necessary, and time should be given for the whole nose of the tool to arrive at a uniform temperature. No method or apparatus should be used for giving the tools the high heat treatment which heats only a portion of the nose of the tool. The whole end of the tool from the heel to the lip surface should be uniformly heated to the same high heat.

If the fire gives a sufficiently intense heat a tool of 2 x 3 in. body can be thoroughly and properly heated in 3 min. from a bright cherry red up to the proper high heat. Without an especially designed furnace, however, it is difficult to obtain a sufficiently uniform and intense heat to treat a tool of this size in 3 min. Smaller tools require from ¾ min. upward, according to the intensity of the fire and the size of the tool to heat from the cherry red to the high heat.

The writer wishes to again emphasize the importance of an intensely hot fire. If the nose of the tool is exposed to the high heat for too long a time or if a fire is used which does not give an intensely hot flame the extreme outside layers of the tool are sometimes slightly injured, probably through oxidization. Therefore, in designing cutting tools, where practicable, they should be forged so as to allow from 1-16 to ⅛ in. to be ground off at the first grinding. This will insure immediately a tool having the highest cutting speed. It is for this reason that in the accompanying illustrations we indicate in dotted lines above and beyond the upper part of the nose of the tool the shape to which the tool should be forged, and in heavy lines the shape to which the tool should be ground at its first grinding.

Cooling High Speed Tools From the High Heat.

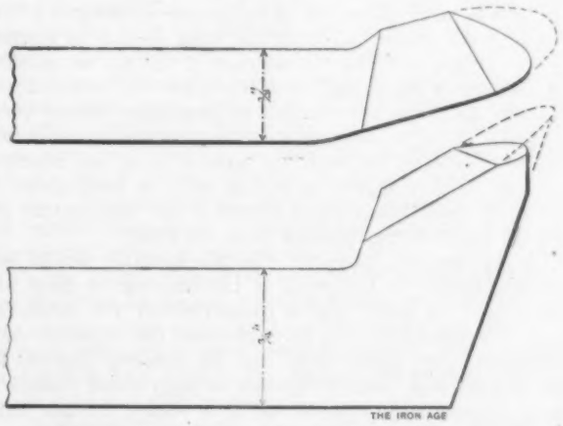
We will refer hereafter to a certain range of temperatures between 1550 to 1700 degrees F., called the breaking down temperatures, and call attention to the fact that the old fashioned self-hardening tools, if heated to with-

in this range of temperatures, are seriously injured or broken down in their cutting speeds.

To get the best and most uniform results with high speed tools after their high heat has been given them, as above described, they should be cooled rapidly until they are below the breaking down point, or, say, down to or below 1550 degrees F. The quality of the tool will be but little affected, whether it is cooled rapidly or slowly from this point down to the temperature of the air. After all parts of a tool from the outside to the center have reached a uniform temperature below the breaking down point, therefore, it is our practice sometimes to lay it down in any part of the room or shop which is free from moisture and let it cool in the air and sometimes to cool it in an air blast to the temperature of the air.

We have found the best method of cooling from the high heat to below the breaking down point to be that of plunging the tools into a bath of red hot molten lead below a temperature of 1550 degrees F. We now plunge them into a lead bath maintained at a uniform temperature of 1150 degrees F., because the same bath is afterward used for reheating the tools to give them their second treatment. This bath should contain a sufficiently large body of the lead so that its temperature can readily be maintained uniform; and for this purpose we use preferably a lead bath containing about 3600 lb. of lead.

The largest sized tool when plunged at the high heat into a bath of this size will not materially affect the



The Dotted Lines Show the Shape to Which the Tool Should Be Forged and the Heavy Lines the Shape to Which the Tool Should Be Ground at Its First Grinding.

temperature of the lead. If too small a lead bath is used and one tool after another is plunged into it from the high heat, before, say, the first tool plunged has been cooled uniformly to the temperature of the bath, the lead may possibly be heated to a higher temperature than it had originally, and this rise in the temperature of the lead, if it were to extend beyond 1240 degrees while the tool is in it, would seriously injure the tool.

Too much stress cannot be laid upon the importance of never allowing a tool to have its temperature even slightly raised for a very short time during the process of cooling down. The temperature must either remain absolutely stationary or continue to fall after the operation of cooling has once started or the tool will be injured. Any temporary rise of temperature during cooling, however small, will injure the tool. This, however, applies only to cooling the tool to the temperature of about 1240 degrees F. Between the limits of 1240 degrees and the temperature of the air the tool can be raised or lowered in temperature time after time and for any length of time without injury. And it should also be noted that during the first operation of heating the tool from its cold state to the melting point no injury results from allowing it to cool slightly and then be reheated. It is from reheating during the operation of cooling from the high heat to 1240 degrees F. that the tool is injured.

The above described operation is commonly known as the first or high heat treatment. To recapitulate briefly, the first or high heat treatment consists of heating the tool:

a. Slowly to 1500 degrees F.

b. Rapidly from that temperature to just below the melting point.

c. Cooling fast to below the breaking down point, *i.e.*, 1550 degrees.

d. Cooling either fast or slow from this point to the temperature of the air.

The Second or Low Heat Treatment.

This treatment consists in reheating the tool which has had the high heat treatment to a temperature somewhere between 700 and 1240 degrees F., rather better results being obtained at the higher temperatures within these limits. For this reheating the best practice is to place the tool in a lead bath containing about 3600 lb. of lead, the temperature of which can be maintained uniform within a few degrees of 1150 degrees F. by means of our exceedingly simple optical pyrometer, and then either cooled in an air blast or laid down to cool in the air. The tool should be held in this bath about 5 min. To avoid danger of fire cracks, particularly if the tool is of complicated shape, it should be heated rather slowly before being plunged into the lead.

We have fixed upon 1150 degrees as the temperature of the lead bath because, even with a sluggish bath slow in either increasing or lowering its temperature, there is danger through carelessness on the part of the operator of allowing its temperature to rise, and so heating the tool beyond the critical temperature of 1240 degrees. If the tool is allowed even for a short space of time to rise in temperature beyond 1240 degrees its property of red hardness will be seriously impaired, and its cutting speed greatly reduced; and a rise in temperature beyond 1350 degrees will completely destroy the property of red hardness in the tool and leave it in its original condition before receiving the high heat treatment. To recapitulate briefly, the second or low heat treatment consists of heating the tool:

a. To a temperature below 1240 degrees, preferably to 1150 degrees for a period of about five minutes; and

b. Cooling to the temperature of the air either rapidly or slowly.

The good effects of the second or low heat treatment can be produced in another way, by running the tool under the friction of the chip until the temperature of its nose has been raised to within the limits of, say, 700 degrees, to 1240 degrees F. Having been heated under the pressure of the chip in this manner, and then cooled to the temperature of the air, the next time that it is run the tool will have a materially increased degree of red hardness and can be run at a higher cutting speed than it was capable of maintaining after the high heat and before the low heat treatment.

Uniformity the Most Important Quality in Cutting Tools.

The writer has many times referred to the necessity of uniformity in the various standards adopted, and we therefore consider uniformity in the red hardness of tools and in the cutting speeds to be the most important element or property sought for. Within one month after having discovered the Taylor-White process we had succeeded in developing a number of tools which were capable of running at as high speeds in cutting steel of medium and soft quality and of lasting as well as any tools developed by us up to the date of application for our patent. The greater part of the time given by us to the development of high speed tools was spent in the effort to obtain uniformity in the tools. The writer looks upon uniformity as of such importance that he does not hesitate to assert that with proper task management more work can be gotten out of a shop with the old fashioned uniform Mushet tools than from a shop without task management and with new high speed tools which are as far from being uniform as they now are in many shops.

Under task management it is of great importance that the workman be fully convinced that the man who operates the slide rule and gives him his speed directions is able to tell him with regularity how to remove metal faster than he could remove it without these directions. Without uniform tools, however, the slide rule man will find himself almost as much at sea as the workman, and thus will be completely discredited in the eyes of the latter.

It is then for the purpose of obtaining uniformity in the tools that our method and apparatus described above for the high and low heat treatments are particularly desirable. It is a very curious fact connected with the development of high speed tools that there are a great number of ways of giving the high and low heat treatments which will produce first-class tools. Perhaps three out of four tools given the high and low heat treatments in these various ways might be called first-class tools. Our method as described above, however, will produce tools which are practically all first-class, and it is for this reason that we recommend its adoption in all shops in which a sufficient number of tools are treated each day or each week to warrant the expense of maintaining lead baths controlled by accurate pyrometers and a proper furnace for giving the high heat.

It would be manifestly improper for the writer to describe in minute detail the apparatus developed by us for this purpose, because some features of the apparatus were patented, while others were mere questions of proportion and design, and the whole of the patents, apparatus and methods were sold by us to the Bethlehem Steel Company after making the invention.

Little Attention Need Be Paid to the Special Directions Given by Makers of High Speed Tools for Their Treatment.

For some years it has been rather amusing to us to hear the special directions given by the various manufacturers of steel suitable in chemical composition for making the high speed tools. Very frequently a tool steel maker implies, or directly states, that the chemical composition of his particular high speed tool steel requires special treatment. The fact is, however, as stated above, that our recent experiments demonstrate beyond question the fact that no other method which has come to our attention produces a tool superior to red hardness —*i. e.*, high speed cutting ability—or equal in uniformity to the method we have described. This applies to all makes of high speed tool steels which are capable of making first-class tools, whatever their chemical composition.

It is the writer's belief that during our long series of experiments at the Bethlehem Steel Company, in our search for uniform tools and for the method of imparting the highest degree of red hardness to tools, we tried substantially every method which since that time has come to our attention. For instance, in giving the tools the high heat we heated them in a blacksmith's coke fire, a blacksmith's soft coal fire, in muffles over a blacksmith's fire and in gas heated muffles. We also constructed various furnaces for this purpose. We heated the tools by means of an electric current, with their noses under water and out of water, and by immersion in molten cast iron. Moreover, by every one of these methods we were able to produce a first-class tool provided only the tool was heated close to the melting point.

In cooling from the high heat we experimented with a large variety of methods. After being heated close to the melting point tools were immediately buried in lime, in powdered charcoal, and in a mixture of lime and powdered charcoal; thus they were cooled extremely slowly, hours being required for them to get below a red heat. And we wish clearly to state the fact that tools cooled even as slowly as this, while they were in many cases quite soft and could be filed readily, nevertheless maintained the property of "red hardness" in as high a degree as the very best tools, and were capable of cutting the medium and softer steels at as high cutting speeds as the best tools which were cooled more rapidly and which were much harder in the ordinary sense.

Tools were also cooled from the high heat in a muffle or slow cooling furnace with a similar result. On the other hand, we made excellent high speed tools by plunging them directly in cold water from the high heat and allowing them to become as cold as the water before removing them. Between these two extremes of slow and fast cooling, cooling in lime, charcoal, or a muffle, on the one hand, and in cold water, on the other, other cooling experiments covering a wide range were conducted. We tried cooling them partly in water and then slowly for the rest of the time, partly in oil and then slowly for the rest of the time, partly by a heavy blast of air from an ordinary blower and the rest of the time slowly, partly under a blast of compressed air and then slowly. We also reversed these operations by cooling first slowly and then fast, as described. We also cooled them entirely in an air blast and entirely in oil, and then partly first in oil, afterward in water, and then first in water and afterward in oil.

By every one of these methods we were able to make a good high speed tool—*i. e.*, a tool having a large degree of red hardness and capable of cutting at very high cutting speeds. But by none of these processes were we able to obtain tools as uniform and regular as those produced by our lead bath and air cooling.

Best Method of Treating Tools in Small Shops.

There are many very small shops in which it is questionable whether the installation of the full apparatus required to treat tools by our preferred method would be warranted. For this class of shops, in treating high speed tools, the writer considers the best method to be as follows, for the blacksmith who is equipped only with the apparatus ordinarily found in a smithshop:

After the tools have been forged and before starting to give them their high heat fuel should be added to the smith's fire so as to give a good deep bed either of coke about the size of an English walnut or of first-class blacksmith's soft coal. A number of tools should then be laid with their noses at a slight distance from the hotter portion of the fire so that they may all be preheating while the fire is being blown up to its proper intensity. After reaching its proper intensity the tools should be heated one at a time over the hottest part of the fire as rapidly as practicable up to just below their melting point. During this operation they should be repeatedly turned over and over so as to insure a uniform high heat throughout the whole end of the tool. As soon as each tool reaches its high heat it should be placed with its nose under a heavy air blast and allowed to cool to the temperature of the air before being removed from the blast.

Unfortunately, however, the blacksmith's fire is so shallow that it is incapable of maintaining its most intense heat for more than a comparatively few minutes, and, therefore, it is only through these few minutes that first-class high speed tools can be properly heated in the smith's fire. Great numbers of high speed tools are daily turned out from smiths' fires which are not sufficiently intense in their heat, and they are therefore inferior in "red hardness" and produce irregular cutting tools.

Coke Fire Preferable to Soft Coal.

On the whole, a blacksmith's fire made from coke may be regarded as better for giving the high heat to tools than a soft coal fire, merely because a coke fire can be more easily made by the smith which will remain capable for a longer period of heating the tools quickly to their melting points. We have, however, recently made some very careful experiments in which, out of a lot of tools made from practically the same steel, each alternate tool was heated in the best type of coke fire and the best type of soft coal fire, and in every case a notably better tool was produced by the first-class soft coal fire. An improvement of fully 4 to 8 per cent. was made by the soft coal over the coke tools. This is undoubtedly due to the fact that a first-class soft coal fire liberates large amounts of hydrocarbons which give an intense heat and are less likely to oxidize the steel than a correspondingly hot flame produced from coke.

Nevertheless, for the reasons given above, our advice is to use a coke fire and make it as deep as practicable. This is for the sake of securing uniformity. We have found it practically impossible to prevent smiths from giving tools their high heat in the soft coal fire long after the fire has passed that period of intensity which is suited to the high heat treatment. When the air blows through the fire and strikes the hot tool it appreciably injures the outer layers of the steel to the depth of from 1-16 to 3-16 in.

Cooling a tool in an air blast from high heat will produce as good and uniform a tool as can be made by any other method outside of that of plunging it into the

hot lead bath. All of the more rapid methods of cooling the tool, either through plunging it into water or oil, render the tool more liable to fire cracks and also more brittle in its body and liable to break in service, particularly when there is any lack of uniformity in the heating, and at the same time cooling in water or oil gives no greater degree of "red hardness" than can be obtained through blowing in the air. And this applies without exception to all steel of the chemical composition suited to making the better modern high speed tools. No attention whatever need be paid to any other special directions given by the makers.

The one question about high speed tools which more than any other has been asked the writer for years past is, "Where can absolutely uniform high speed tool steel be bought?" and the writer's invariable answer has been, "Any one of the first-class makes of high speed tool steel is amply good. The trouble does not lie with the lack of uniformity of the tool steel. The main trouble is that you have not yet stolen the whole of the invention. You had better go back and steal it all."

Several types of apparatus have been developed for giving high speed tools their first or high heat treatment as well as for giving them their second or low heat treatment. For a description of some of these the writer would refer to Mr. Gledhill's admirable paper, previously mentioned, and also to an article by O. M. Becker and Walter Brown in the *Engineering Magazine* for November, 1905.

Importance of Not Overheating High Speed Tools in Grinding.

The writer trusts that he has made the fact clear that the property of "red hardness" in tools is seriously impaired by even temporarily raising their temperature beyond 1240 degrees F. He ventures to say that fully half of the high speed tools now in use in the average machine shop have been more or less injured and are therefore lacking in uniformity, owing to their having been overheated during the operation of grinding. Even when a heavy stream of water is thrown upon the nose of the tool throughout the operation of grinding, tools can be readily overheated by forcing the grinding or by allowing the tool to fit against the grindstone. This injury is all the more serious because there is no way of detecting it except by finding through actual use that the tool has become of inferior quality. The writer has frequently seen tools which were ground under a heavy stream of water heated so that the metal close to their cutting edges showed a visible red heat.

Occasionally tools are also overheated by running at too high speeds in the lathe. In this case, however, the injury to the tool is perfectly apparent and therefore not so serious as the overheating on the emery wheel. A tool which has been overheated either in grinding or in the machine can be again rendered first-class in quality by grinding it from 1-16 to 3-16 in. back from the cutting edge and down from the lip surface, because overheating from grinding or running in the lathe rarely penetrates beyond this depth.

The best advice that we can give to those desirous of having uniform tools is not to experiment with new brands of tool steel. Adopt once for all the best that can be had at the time the choice is made, and then see to it that the smith heats each tool uniformly and rapidly close to the melting point, and that the grinder does not overheat the tool in sharpening it. Watch the smith and the grinder; do not change the make of the tool steel.

Belgian Coal and Iron Statistics.—The annual report of the general director of mines for Belgium shows that in 1905 the output of coal was 21,775,280 tons, as compared with 22,761,430 tons in 1904. The production of ordinary coke was 2,238,920 tons from 4002 ovens; of blast furnace coke the production was 287,770 tons from 246 ovens. Out of 41 blast furnaces in Belgium 35 were operated in 1905, and the output was 1,311,120 tons, divided as follows: Foundry iron, 98,170 tons; forge iron, 206,309 tons; Bessemer iron, 220,210 tons; basic iron, 784,850 tons; ferro and speigel, 1581 tons. The production of steel works amounted to 1,095,880 tons of Bessemer ingots, 104,550 tons of open hearth ingots and 26,680 tons of castings. The production of finished iron was 377,620 tons, and of finished steel 1,091,400 tons. The principal items in the latter total were 299,290 tons of merchant steel, 241,640 tons of rails and sleepers, 159,400 tons of structural shapes and 143,150 tons of plates.

San Francisco Seeking the Nevada Mining Trade.

SAN FRANCISCO, December 3, 1906.—San Francisco's business men are after the trade of the new mining sections of southern Nevada, and an excursion planned lately reached Goldfield yesterday. It was received with the utmost cordiality by the representatives of the new El Dorado. C. A. E. Barnes, R. S. Billings and Alexander Russell constituted the deputation that led the San Franciscans over the show places of the celebrated mining field. At Tonopah they were entertained by the Mizpah Club, and altogether came to the conclusion that the talk of gold at Goldfield and of silver at Tonopah had not revealed half the truth. N. H. de Young, the owner of the *Chronicle*, and a man of enterprise, and Henry T. Scott, for many years the manager of the Union Iron Works—men who have done their share in developing the industries of California—were among the San Franciscans. The result of this visit will be equally beneficial to the mines and to San Francisco. There will be a big trade developed in that great mining section. Goldfield now contains a population of 15,000, supported by its mines, but will have a much larger one when there is sufficient money invested in it. The same is true of Tonopah, the mines of which are principally silver and gold, the latter predominating as in the famous Consolidated California-Virginia bonanza. These are the two principal mining sections, but Bullfrog, Manhattan and others are coming to the front, and in the course of time will be as famous as any.

Even now, in their infancy, a great business with these localities is being done. At Miller's the Tonopah Company has an immense new mill and power plant, erected by the Charles C. Moore Company of this city. The amount of this contract was considerably over $500,000. Many millions have been already expended for machinery in the Tonopah and Goldfield mines. As three of our principal foundries—the Union, the Risdon and the Fulton—escaped the ravages of the fire, they are ready at a moment's notice to take any kind of a contract, no matter what the size. Our machinists have fallen on good times. Not to mention other matters of promise, the machinery for the steam schooners now being built on the coast will cost at least $1,000,000, and nearly all of it will be installed in San Francisco.

There are nine skyscrapers at present in all stages of completion within half a dozen blocks from the corner of Market, Kearney and Third streets, and the work on them is rapidly progressing. There is no establishment here by which all the steel frames of buildings could be put up, but some advancement is being made, and some of the new contracts call for iron in the construction which is to be prepared for the builders' use in this city. These, however, are few and far between, and but serve to accentuate our backwardness in this respect.

To turn to other matters, we have had as yet next to no rain and our farmers are somewhat discouraged by the outlook. Of course early rains benefit by preparing the earth for the plow later on, and are beneficial to the sown grain, but late rains will always give a crop, provided they do not come too late. Absence of rain, however, keeps back business, and no matter how fair the prospects may be after the spring rains there is never the same amount of goods sold as when the regular fall precipitation has come in time But the activity in the building trade keeps up the hardware business.

J. O. L.

The Government statistics for the production of iron and steel in France in the first half of 1906 show 1,573,504 metric tons of pig iron, an increase of 73,000 tons over the corresponding period of 1905, and 384,000 tons of rolled iron and steel, an increase of 18,000 tons.

The Saw-Tooth Skylight in Roof Construction.*

BY FRED. S. HINDS, BOSTON, MASS.

Before Dr. Cartwright invented the power loom in 1785 the cotton spinning factories had attained quite a considerable growth in the Lancashire District of England. When the cotton loom came into practical use weaving was carried on in the homes of operatives, up to the time when, with the increase in cotton weaving and the advent of the power loom, it devolved upon the progressive operator to branch out into a new plant and set up a few power looms as a weaving establishment.

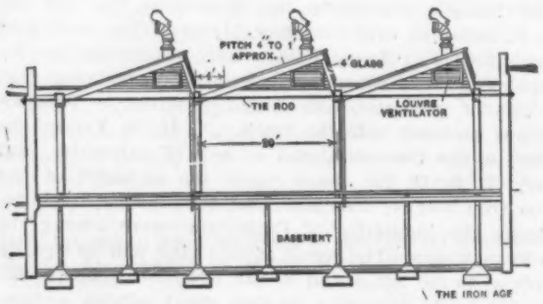


Fig. 1.—Standard Saw-Tooth Skylight in Mill Construction. —Fiberloid Company's Plant at Indian Orchard, Mass.— Flat Roof Between Skylight and Ventilators.

This naturally was a one-story building and in time was designated as a "weave shed." Thus was commenced a system in textile manufacture which became popular, and is to-day in England and on the Continent. The spinning factory produces the yarn and the weave shed the cloth.

The Genesis of the Saw-Tooth Type.

As these weaving companies changed from plain to fancy and colored weaving and increased the width of the weave sheds to gain greater area some method of roof lighting became necessary. Thus necessity, the mother of invention, produced the saw-tooth form of roof skylights for lighting the center of the wide one-story buildings. The English and continental manufacturers were not long in appreciating the value of this method of lighting. The first use was on machine shops making cotton machinery. To-day they are found on all kinds of manufacturing plants.

The principle in this so-called "saw-tooth" form of skylight is the focusing of a strong north light upon the work in process. This is secured by the greenhouse type of sash, applied to one side of the saw-tooth and exposed to the north light, the glass being set at such an angle as not to admit the direct rays of the sun. This type of sash reduces to a minimum the woodwork, and thus minimizes the obstruction of light and the casting of shadows. The result is a practically continuous window of glass, which gives a far greater lighting area than wall and windows, or than skylights placed in the usual manner at intervals. The skylights may run across the building, or lengthwise of the building, so that the glass may face to the north. Placed across the building they are somewhat simpler in construction and thus less expensive.

The Method of Construction.

To-day there are two constructive designs in applying these skylights, one English and the other American. The English design is in the true form of saw-tooth, the American in the modified form, or semisaw-tooth flat roof design. The English design was Americanized by the writer, as shown by the accompanying illustrations, to meet the conditions of our rigorous and changing climate. In 1885, when associated with a mill architect and engineer, the writer was called upon to design some method of roof lighting on a one-story addition to be built in a mill yard area, formed by three buildings in the shape of the letter U. The problem was to light this area and project light into the first story of the then existing buildings, so as to make up for the loss of light due to roofing over the yard area.

This same year the writer happened upon an English type of saw-tooth lighted weave shed in connection with a mill plant in the same neighborhood. Upon examination it was found to be giving trouble from leaks. In this type of roof the acute angle formed by the two sides of the skylight was finished in the form of a gutter made up of sheet metal. These gutters fill up with snow and water, which melting and freezing cause excessive expansion and contraction and the result is cracks and broken joints. The writer, profiting from this experience, designed a semisaw-tooth flat roof. In this type the space between the skylights was finished in the usual gravel roofing, the slant of the roof conveying the roof water to the end of the skylight, where it enters the gutter.

The angle of the glass is designed by some at 60 degrees, but when the sun is in the zenith it will shine through these skylights. This matter has been lost sight of, as one of the leading features in the principle of saw-tooth skylights is the elimination of the direct rays. For the South the writer has used 77 degrees and for the North 71 degrees.

Changes in the Original Design.

In my later designs I have reduced the wide flat roof space between the skylights and somewhat reversed the modification, returning more closely to the English system, but at the same time preserving a narrow flat roof between adjoining skylights, varying in width from 24 to 48 in., according to circumstances. (See Figs. 1, 2 and 3.)

The flat gravel roof was then reduced from ½ to ¼ in. pitch to the foot in order to convey the water away in the usual manner, and avoid the building up of such high forms as would be necessary with ½-in. pitch. The hight of the glass is based entirely on the class of manufacture and amount of light required. Four, 5 and 6 ft. have been my usual basis to work from in determining the size to use. Four ft. high every 20 ft. is good for general use. Five ft. is used for special cases, such as high erecting shops, and the 6 ft. for cases where extra strong light is required.

In the year 1900 the writer was called upon to design, in connection with the planning of a Southern cotton factory, the weave shed for weaving pattern fab-

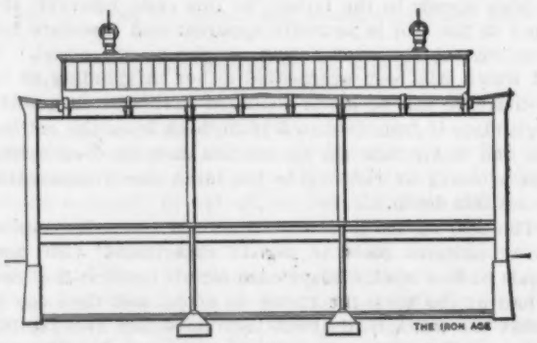


Fig. 2.—Front View of Saw-Tooth Skylight of the Fiberloid Company's Plant.

rics. In adopting the saw-tooth skylight all cross timbers had to be eliminated to avoid the casting of shadows. Appreciating the value of north light and to avoid any direct sun rays the sash was set at an angle of 77 degrees. This angle, which brings the sash only 13 degrees from the vertical and therefore not at a great inclination, led to the belief that the elaborate trussed form in framing these skylights was entirely unnecessary to resist this small amount of thrust. I therefore adopted the tie-rod as the lower chord spanning from column to column, anchoring at each end wall.

Fig. 3 illustrates the various details of my latest skylight design, and it will be noted that both the double glazing and single glazing are represented. I would draw par-

* From a paper read December 5, 1906, at the New York meeting of the American Society of Mechanical Engineers.

ticular attention to the details of the metal bars. The bars and the bottom of the glass are provided with small gutters for collecting any condensation, and openings are provided in the horizontal metal work for letting out the water as it collects. The double glazing is necessary for some manufacturing plants in the North, but only single glazing is used in the South. The flat gravel space between skylights and the method of flashing are also detailed. One element of weakness in the construction of some roofs of this type is that the galvanized iron is continued down on the roof and becomes a part of the flashing. True flashing and the best should be in about 10-oz. zinc, running up behind the counter-flashing or outer flashing of the skylight. Fig. 3 also shows the slat walk, which it is wise to provide in Northern skylights, intended not only to walk upon but to facilitate the shoveling off of snow without destroying the gravel roofing.

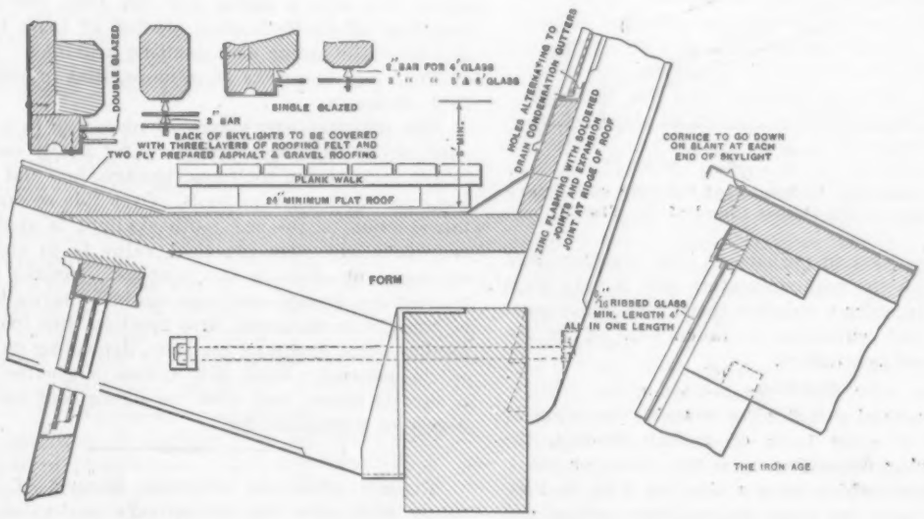

DOUBLE GLAZED
SINGLE GLAZED
BACK OF SKYLIGHTS TO BE COVERED WITH THREE LAYERS OF ROOFING FELT AND TWO PLY PREPARED ASPHALT & GRAVEL ROOFING
PLANK WALK
24" MINIMUM FLAT ROOF
FORM
HOLES ALTERNATING TO DRAIN CONDENSATION GUTTERS
ZINC FLASHING WITH SOLDERED JOINTS AND EXPANSION JOINT AT RIDGE OF ROOF
CORNICE TO GO DOWN ON SLANT AT EACH END OF SKYLIGHT
RIBBED GLASS
MIN. LENGTH 4'
ALL IN ONE LENGTH
THE IRON AGE

Fig. 3.—Detail of Americanized Saw-Tooth Skylight for Factory Roofs.

Snow and Saw-Tooth Skylights.

This leads to the subject of snow and whether it is detrimental to the use of skylights. As the prevailing winds in snowstorms are either from the northeast or northwest it is found to be true (according to observations in a locality in Massachusetts where this style of skylight is very popular) that the wind in a high storm will blow the snow out, because of the somewhat funnel or grooved shape of the skylights. However, suppose they do fill up somewhat with snow it is not a great expense to hire cheap labor to shovel out this snow, as through our whole winter period heavy storms are only occasional. The cost of shoveling out the snow is a very small expense, as compared to the enhanced value that fine lighting gives to the production of the plant. It must be conceded that with a monitor skylight in a drifting storm the vertical side would resist the snow and pile it up, and naturally get the same result as with the saw-tooth. Right here the English system would show its serious defect. The advantage of the flat roof is that it spreads out the saw-tooth into a wider area and the snow cannot pile so deep as in the V form.

An Expensive Form of Construction.

Fig. 4 illustrates the elaborate trussed form of framing. Fig. 5 shows a similar form in reinforced concrete. I believe it is entirely unwarranted, as it increases expense in construction and becomes an obstruction to its own light. Fig. 5 shows two very weak points. First, you will note at A that the tin roofing forming the gutter, or flat valley, runs up under the slag or gravel roofing, as you would flash under a slate roof. This is at a vertical wall. The same criticism applies at the gutter formed by the skylight itself, or at B. It is well known in building construction that the worst form of gutter is to have the slant of a roof strike up against a vertical wall, where a gutter or flat valley must be constructed to carry away the roof water. It makes a very acute angle in which snow and water can collect. The water is taken up by capillary attraction and percolates through some crack in the roofing higher up than the highest point of the tinwork, which runs up under the gravel roofing.

Some designs have the sash set vertically. This is uncalled for, as with the same hight of glass, if sash is set at an angle, the area of direct rays of light is increased. There is also less length of slant for the back of the skylight and thus less roof area to cover. This vertical design was used for the purpose of hanging the sash with weights or on a pivot. The slant from the vertical is so small there is no trouble from the weather beating in.

Wood and Metal Sash Construction.

The sashes are constructed either of wood or sheet metal. If of wood, the glazing is with putty; if of metal, the glazing is done without putty and bars are formed to take care of condensation. With reference to wood as compared with metal skylights, and what metal workers are doing under contract at the present time, the following is a quotation from a letter on the subject: "We have a contract at present for changing over four saw-tooth skylights, about 200 ft. long by 15 ft., glass opening, from wood construction to metal construction. We have in hand also two saw-tooth skylights that we are erecting in metal. These are about 90 ft. long by 10 ft. 6 in. glass measure. Heretofore the saw-tooth skylights for this company have been built in wood, and a departure was made in favor of metal." The one referred to as 10 ft. 6 in. glass measure and 90 ft. long is not a continuous skylight, but a number of skylights with spaces between. These were designed, no doubt, in this way on account of the saw teeth running lengthwise of the building. This excessive hight could have been overcome by forming a continuous skylight, utilizing the spaces between, thus reducing the hight of the glass and making up for it by this increase in length.

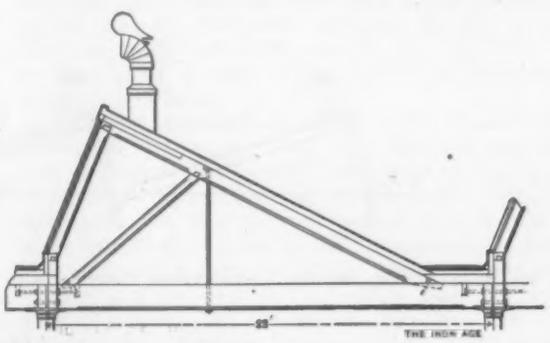


Fig. 4.—Elaborate Trussed Form of Saw-Tooth Skylight.

The subject of ventilation in connection with this

particular class of skylight has gone through changes along with the vicissitudes of the skylight itself. When these skylights were first introduced on weave sheds of cotton factories no ventilation was provided. Later, as the skylight manufacturers developed new inventions, the louvre ventilator was adopted and used in the end of the saw teeth, as a substitute for round windows, which may have been hung on swivels. Next followed the usual style of galvanized iron ventilator common in metal skylights used on other classes of buildings. The latest method is to hang one-half the length of the glass at the top and control by the usual quadrant for opening at any

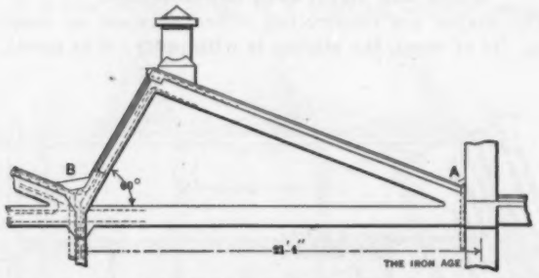


Fig. 5.—Saw-Tooth Skylight in Reinforced Concrete with Heavy Concrete Beam as the Botton Chord of the Truss.

angle. These are good in periods of clear weather, and in connection with the roof ventilators give a very good current of air. In stormy weather these side lights must be closed, and the ventilation is taken care of by the louvre and the roof ventilators.

Roofing.

The most approved practice for covering the back of these skylights is some form of asphalt roofing, the method of applying depending upon the angle, or slant, of the roof. Those which have a slant of 4 in. to 1 ft. can be covered with the usual asphalt felt roofing and then with gravel, the same as a flat roof. If the slant is greater, then the two upper layers of felt should be applied in what is called "prepared gravel asphalt roofing." The flat spaces between the skylights can be of the usual coal tar, felt roofing and gravel, unless one prefers to have it all asphalt at a slightly increased cost.

Saw-tooth skylights do not add to the architectural beauty of a factory building, and therefore I have studied to keep them down to a reasonable hight and at the same time make them high enough to give the amount of light required.

The use of reinforced concrete in factory buildings suggests its adaptability to saw-tooth skylight construction. Fig. 6 illustrates how this "Americanized" saw-tooth form can be very simply constructed in reinforced concrete and embody all the features necessary.

Forms of Service.

Saw-tooth skylight construction is not only adapted to cotton factories, but to factory buildings, machine shops and all kinds of manufacturing plants where better lighting is required than can be obtained from side windows. It is superseding the common monitor roof, and is especially adapted for use over erecting rooms and crane rooms of machine shops. It solves the problem of the one-story flat roof machine shop or factory, where this style of construction is desirable and wide buildings are required. In shop economics, and with the extensive area of modern plants, the monitor skylight compels an excessive length in buildings, while the saw-tooth skylight admits of a proportionately greater width and less length, hence giving a more compact arrangement of the shop departments and a thus greater available area of floor space.

Where land is valuable it is applicable to the two-story shop or factory, if special provision is made for lighting the first story. My latest application to a machine shop was a design for the John Thomson Press Company of an 80-ft. shop erected at Long Island City in 1905 while acting as consulting architect. This width of 80 ft. had two rows of columns, thus practically three 25-ft. divisions.

The manufacturer's general plan was to use the two outer divisions of the first story for heavy tools and the center division for toolroom, storage, &c., and the second story for light machine tools. Over this second story the introduction of the saw-tooth skylight is applicable and very practical. Its practical value is in the improved arrangement of tools and benches. Instead of running the benches around the room against the walls they can be run across the room; first benches, then tools alternating down the length of the shop, depending on the nature of the product. With this system a greater production is sure to follow, and with the strong roof light a higher degree of workmanship.

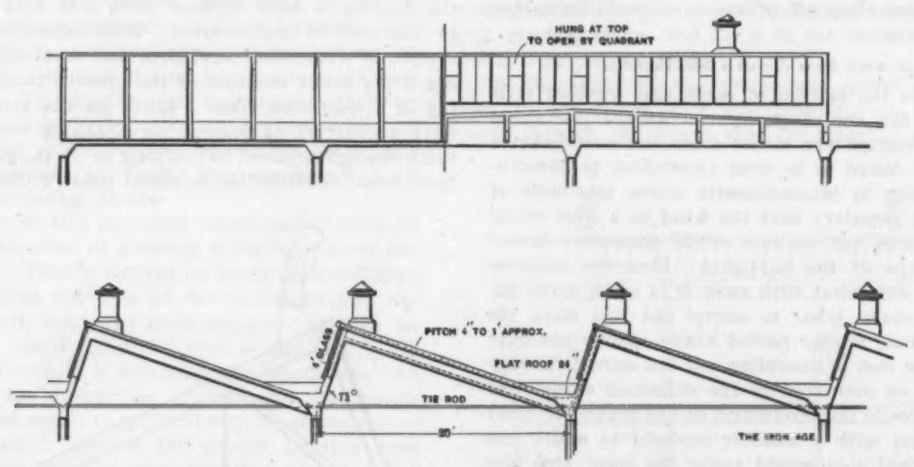


Fig. 6.—Saw-Tooth Skylight in Reinforced Concrete, with the Bottom Chord of Trussed Form Simply a Tie Rod at the Column Line.

Figures given by Director Roberts of the United States Mint show that the world's production of gold in the calendar year 1905 was $376,289,200, against $346,892,200 in 1904. It is predicted that the gain of 1906 over 1905 will be even greater, so that the world's production this year will exceed $400,000,000. The South African increase alone is believed to be sufficient to insure this. The mines of the United States produced $88,000,000 worth of gold in 1905, a gain of nearly $8,000,000 over 1904, and it is estimated that the increase this year over 1905 will be about $10,000,000.

The Gallinger Ship Subsidy bill came before the House Committee on Merchant Marine and Fisheries at Washington December 6. The committee appears to be evenly divided, and doubt is expressed of the ability of the advocates of the measure to have it reported to the House. Chairman Grosvenor has suggested that a new bill be drafted confining the subsidy to ships in the South American and Far East trades and eliminating trans-Atlantic and African line subsidies.

Winter in the Ore Region.

DULUTH, MINN., December 7, 1906.—The season closed at Marquette mines with the cleanest stockpile grounds ever known. It is but twice in the past 15 years that Cliffs' shaft, for instance, has cleaned up its ground at the end of the season, but now there is no ore left. Mines that have frequently carried stocks long enough for them to become mossgrown are now stockpiling on clean grounds. At the Oliver Iron Mining Company's Lake mine, and its Hartford and Section 21, there will be considerable ore left if the weather does not warm up and permit the movement of ore later. There will be shipments from many properties, especially on the older ranges, just as long as it is possible to get shipping or ore can be moved, but every day now vessels are lying by and the western ranges, especially the Mesaba, are practically through. The thermometer registered 10 degrees at Mesaba range points December 1, and that shuts off business.

Preparations for the winter on all ranges are evidence of what is expected of the coming season. Extensive stock trestles are built and mines are even now sending ore to surface with speed.

The Cleveland Cliffs Company is preparing to reopen its old Imperial mine at Michigamme, which was run some years ago, but has been full of water since. It is a small deposit, so far as known, of reasonably good ore. Open pits at the company's Jackson property are closed down and the crusher has stopped business for the year. This mine has made the best record of its entire history.

On the Cascade Range

the vast quantities of siliceous ores, low in iron and frequently low in phosphorus, which are found there, are now far more eagerly sought for than in the past. While the amount of such ores that can be utilized in furnaces is limited by the requirements of mixtures, it is growing and will in time be a material consideration. These ores run about 40 per cent. iron, are very low in moisture and are close to the Bessemer limit in phosphorus, frequently much under it, and they are admirable as mixtures. These ores are close to the surface and can be mined at slight cost, and they are slabby in texture, breaking well with powder. At one company's property in this district more ore has been discovered this year than has been shipped out of Lake Superior. This may seem an astonishing statement and will doubtless be challenged, but that it is correct is unquestionable. Several operators are in this field, and among many properties that have been taken for exploration is the old Volunteer mine, which has been kicked about as a football for many years. The Oliver Iron Mining Company has an enormous deposit in its Moore mine in that field; the Cleveland Cliffs Company has almost limitless possibilities there, and Corrigan, McKinney & Co., A. F. Maitland, J. T. Jones, Longyear & Bennett and many others are actively interested there. The district is not only favorable for lean ores, but shows better with depth.

The New York State Steel Company

has taken a second explored property on the Mesaba range, the northeast of the northeast of section 4-58-17, heretofore called the Tesora, and a small shipper. It contains some 600,000 tons of medium grade ore, and was secured at a reasonably low price. It will be developed in conjunction with the Kellogg in section 9 of the town directly east, where this company is now clearing the ground preparatory to starting a shaft. It is expected that next year's shipments from Kellogg will be 100,000 tons. This new company is entering the iron ore field with vigor, and is making a number of explorations, with the view of developing its own mines, if possible. It now has sufficient ore to maintain its expected production for a number of years, and is safe in going forward with exploring on land that may or may not produce results. It has begun explorations on some tracts and has several others under consideration, at least a few of which will doubtless be taken up in due time. Perhaps no concern is now looking for ore on the Mesaba more vigorously than this new Eastern steel interest.

The Republic Iron & Steel Company, which has been stripping its Kinney mine all summer, expects to continue this work through the winter with one shovel, and is moving off about 50,000 yd. a month. This is all done on company account, and the costs are rather low—that is, they average about as this correspondence has reported for stripping on company account from other operations with which the writer has been familiar. This is considerably under the rate for contract work. The mine is to be put in shape for a production next year of about 400,000 tons, which is 300,000 tons larger than its average, though this year the total is better than it has been heretofore. Most of Kinney's product for next year has been sold to other consumers.

The Oliver Iron Mining Company

is to open its Gilbert ore body in 26-58-17, adjacent to the Malta, Sparta and Genoa, and will begin work as soon as stripping outfits can be removed there from the neighboring mines of Eveleth. This mine has been very thoroughly developed by extensive drilling, and will be mined by the most modern and scientific methods. It will probably be some time before any large tonnage can be moved from there. One of the chief producers of the Oliver Company next year, eliminating such mammoth properties as Mountain and Hull, will be Stevens, in 59-15, where stripping has been under way for years. Another very large producer will be Fayal, which has not equalled its high record in the past two years. But a large amount of development has been done there recently and enormous amounts of ore lie exposed for the steam shovels.

A very large proposed purchase of timber lands in northeastern Minnesota, which has been under consideration by the Oliver Iron Mining Company, is now off, temporarily at least.

In the consideration of operations on the Mesaba another year and the new development likely to result in steam shovel stripping, with its effect on increased and easier mining, it is well to remember that steam shovel manufacturing capacity is limited. It is stated that every steam shovel shop in the country is filled with work for all of next year, and that orders cannot now be filled. There is a limited number of these shops and their outturn is easily figured. The enormous orders of the Oliver Iron Mining Company, Panama Canal orders and the new use of the shovel in copper mine work in Bingham and Ely, as well as the demand from railroad contractors, have had their natural effect on the makers. Contractors on the Mesaba range have about all the work for 1907 that they dare take up, while the larger mining companies that do their own stripping are full of work. The new operations of the coming year, therefore, must be determined to some extent at least by limitations of material and labor.

Speaking of labor, it is astonishing that matters have moved here all season with such ease and smoothness, and they could not possibly have done so but that the utmost skill was manifested in the government of the situation. The Eastern iron market owes a good deal more than it appreciates to the extraordinarily able men who control the destinies of the Lake Superior ranges, especially of the Mesaba, from which comes not only the bulk of product, but the annual increase. The prevention of labor difficulties, hence the manning of mines with a sufficient force to handle the enormous tonnage produced, is but one of the chief lines in which the ability of these men is frequently shown. Indications are that labor will be fully as plenty, quite possibly more so, another season than it has been the past. There is now an ample supply for the woods, and this is often an index of what may be expected later. D. E. W.

The returns of the Association of Iron and Steel Producers show that the production of pig iron in Germany and Luxemberg in October was 1,073,874 metric tons, as compared with 1,036,753 tons in September this year, and 1,006,943 tons in October, 1905. The total production of pig iron in the first 10 months of this year was 10,289,967 tons, as compared with 8,970,539 tons in the corresponding period of 1905, an increase of 1,319,428. The production for the 10 months of this year exceeds that for the entire year in either 1903 or 1904.

Cutting Steel Piles by Electricity.

In the construction of the new Hoffman House at Broadway and Twenty-fifth street, New York City, electricity is used to cut the heavy interlocking steel piling used in the foundation work, and which, owing to the unevenness of the underlying rock, projected unevenly above the proper level. Through the courtesy of the *Electrical World* we are enabled to give the following description of this interesting application of electricity:

Unfortunately, direct current could not be used in the process without throwing the Edison three-wire system out of balance, as it would be necessary to use the Edison service, which has a grounded neutral, or else install an

Fig. 1.—The Operator and Electrode Cutting Steel Piles.

isolated plant, which was out of the question. Four 20-kw. transformers are connected in multiple to the lines of the United Electric Light & Power Company, which are single phase, and have a potential of 2500 volts. The secondary voltage is 50. Experiments were made with current at a potential of 105 volts, and again with current at a potential of 25 volts, but both potentials proved unsatisfactory, so that the original potential, 50 volts, was retained. One wire of the circuit is bolted to the sheet piling, and the other is connected directly with the carbon electrode. The latter is 1¼ x ¾ in. long, and is clamped between two plates of copper 5 in. square by ½ in. thick. A Dossert lug is used to make the connection, as a sweated joint is out of the question because of the intense heat. As it is, the copper plates buckle after 15 hours' use and new ones must be provided.

The workmen wear masks of asbestos and gloves of the same material to protect them from the heat. The mask is provided with double black glass, which will permit the operator just to see the arc. This protection is put aside at all times when the arc is not in use, but during the cutting process the arrangement permits the arc to be carefully scrutinized without any injury to the eyes or skin. When first tried no protection was thought advisable; but it was found that even at a distance of 11 ft. from the arc the carbon dust and fumes festered the lips of the operator, and at night the pain in the eyes was intense. The arc produced an excessive flow of water from the eyes, and it appeared to the operator as though a film were thrown over them. The heat also blistered the skin.

The arrangement of the cutting electrode is clearly shown in the illustrations. Fig. 1 presents a view of the operator and electrode, the operator having his face and eyes protected; Fig. 2 shows the support for the electrode and the character of the piling; Fig. 3 gives a view of the cutter in operation, and Fig. 4 shows the character of the cut made. The circuit is completed without extra resistance; the operator merely pushing the carbon electrodes against the iron, thus forming the arc. Once started, care is exercised by the operator that the arc is not disrupted. The depth of the cut varies from ½ in. in the center of the pile to 3½ in. at the junction. Tests show that 650 amperes is consumed at the arc, and at a potential of 50 volts, this is equivalent to a consumption of 32 kw. In a day of eight hours it has been found that with the device 10 ft. of piling can be cut through with an energy consumption of 256 kw.-hr. The wage of the attendant is $4 per day, and even with energy at 10 cents per kilowatt-hour the total cost of operation is in round numbers $30 per day, or $3 per foot of piling cut. It has been found that with the use of electric drills two men were required to cut through a foot of piling in a day. The wages of these two men was $9, and the energy consumption of the drills was 44 kw.-hr. With energy at the same rate this would cost at the rate of $13.40 per foot of piling cut. Neglecting entirely the question of dispatch, which is all important in New York building operations, the arc cutting device shows a saving of over $10 per foot. The actual saving is somewhat more than this, since with the energy consumption of the arc cutting device and considering that it is a day load, the rate would be less than 10 cents per kilowatt-hour.

Operation of the Federal Bankruptcy Law.

WASHINGTON, D. C., December 11, 1906.—The Bankruptcy Division of the Department of Justice has completed its annual statistical report upon the operation of the Federal Bankruptcy law. The figures reflect the general prosperity of the country and indicate that the volume of cases under the law, both voluntary and involuntary, is now about normal and is no longer influenced by the original movement of old State bankrupts to secure discharges valid throughout the United States.

An innovation in the manner of compiling the reports of clerks and referees has been made by the Bankruptcy Division, the figures here presented covering the period from October 1, 1905, to June 30, 1906, instead of to October 30, 1906. Hereafter they will be compiled by complete fiscal years. Because of this change the statistics are not exactly comparable with those of last year, but bearing in mind the fact that they are for nine rather

Fig. 2.—The Support for the Electrode and Character of the Piling.

than for 12 months, it is not difficult to note their general tendencies.

Voluntary Cases.

The report from the clerks of the courts of bankruptcy show that the grand total of voluntary proceedings instituted in the nine months ending June 30, 1906, was 10,526, as compared with 13,852 for the year ending September 30, 1905. This is a very slight relative increase, but may fairly be said to be negligible, especially when it is remembered that the reports for several of the smaller districts for 1905 were not received in time to be included in the official summary. The figures for 1905 were about 6000 less than for 1900 and 1899. The very great decrease as compared with the early years in which the law was in force is attributable to the fact that many insolvents of years standing took advantage of the Federal statute to secure discharges operative in all parts of the country. It is

now believed that the petitions currently filed are about normal in volume and will not be materially increased except in the event of general financial depression.

The States showing the largest number of cases filed the nine months ending June 30, 1906, are as follows:

Illinois, 1094 petitions, of which 871 were filed in the northern district.

Alabama, 984 petitions, of which 789 were filed in the northern, 148 in the middle and 47 in the southern district.

New York, 946 petitions, made up of 193 in the northern, 382 in the southern, 137 in the eastern and 234 in the western district.

Massachusetts, 787 petitions.

Ohio, 539 petitions, made up of 340 in the northern and 199 in the southern district.

Maine, 493 petitions.

Fig. 3.—The Electric Steel Pile Cutter in Operation.

Pennsylvania, 395 petitions, made up of 125 in the eastern, 96 in the middle and 174 in the western district.

For the purpose of making a comparison with the above the record of the seven States in which the largest number of petitions was filed in the year ending September 30, 1905, is given as follows: New York, 1363 petitions; Illinois, 1358; Alabama, 1275; Massachusetts, 1103; Maine, 651; Ohio, 621; Pennsylvania, 521.

In the nine months ending June 30, 1906, 10,575 cases were adjudicated and 380 petitions were dismissed. Discharges were refused in 51 cases, while in 121 cases compositions were confirmed by the courts.

In the nine months ending June 30, 1906, 9128 voluntary cases were closed, in which the total of assets realized amounted to $6,047,865 and the liabilities involved therein aggregated $65,142,690. In the petitions upon which reports were made the liabilities scheduled in 1347 cases were between $100 and $500, in 1543 cases between $500 and $1000, in 1347 cases between $1000 and $5000, in 1043 cases between $5000 and $10,000, in 592 cases between $10,000 and $20,000 and in 521 cases in excess of $20,000. The total fees, commissions and expenses deducted from estates during the nine months covered by the report aggregated $893,955.

The referees' reports show that of the cases closed 838 of the petitioners were farmers, 2748 wage-earners, 2388 merchants, 439 manufacturers, 451 engaged in some profession and 1916 engaged in various other lines of business not specially enumerated. Of the petitions filed, 584 were presented in *forma pauperis*.

Involuntary Cases.

The number of petitions filed to have insolvents adjudged involuntary bankrupts in the nine months ending June 30, 1906, was 2546, as compared with 3094 for the year ending September 30, 1905. Of the petitions filed, 505 were dismissed either because the court had no jurisdiction or because no act of bankruptcy had been committed. In 139 involuntary cases compositions were confirmed.

In the nine months ending June 30, 1906, 1586 cases were closed in which the liabilities were scheduled at $37,622,541, while the net assets realized amounted to $8,752,703. Of the cases closed the liabilities in 371 were in excess of $20,000, in 268 between $10,000 and $20,000, in 326 between $5000 and $10,000 and in the remainder they were less than $5000.

The total fees, commissions and expenses paid in the nine months amounted to $1,264,895.

The petitions disclosed the fact that of those who were adjudged involuntary bankrupts 530 were merchants, 170 manufacturers, 15 professional men and the remainder engaged in various pursuits.

In view of the brevity of the present session and of the general desire on the part of the friends of the Federal bankruptcy statute that no opportunity for its repeal shall be presented, no suggestions as to changes in the law are submitted by the Department of Justice.

W. L. C.

The Billings & Spencer Company's Proposed Canadian Branch.

The Billings & Spencer Company, Hartford, Conn., has decided to open a Canadian branch for the manufacture of its line of goods and has incorporated under the name of the Canadian Billings & Spencer Company, Limited, with F. C. Billings of Hartford as president. The capital of the Canadian company is $200,000, and it will engage in the manufacture of drop forgings and drop forging machinery. The company will be the first in Canada in this line of business, and by its establishment will enjoy certain advantages besides reduced freight bills. A specialty will be made of auto and bicycle parts. The location of the new plant has not been decided upon though several towns are endeavoring to secure it. The manager of the new plant, it is announced, will be J. Gill Gardner of Brockville, Ont., and a special effort will be made by his town to get the new company to locate there. Mr. Gardner is manager of the tool, steel and forge department of the James Smart Mfg. Company of Brockville, and will leave its employ January 1. Newspapers in Montreal and Brockville express gratification at the announcement of the formation of the new company and the outlook for its success in Canada, at the same time referring in well merited complimentary terms to the old established company now doing business at Hartford.

Fig. 4.—The Character of the Cut Made by the Electrode.

The report of the second annual convention of the West Virginia Board of Trade, held at Charleston, W. Va., October 9 and 10, will soon be issued from the press and promises to be a very interesting volume. It contains a stenographic report of the proceedings, including able addresses, replete with information about the State and its great resources. The book will be a compendium on West Virginia's wealth and the magnificent opportunities it offers to the manufacturer, the business man and the homeseeker. Several thousand copies will be issued, and may be had on application to the secretary's office at Wheeling.

The Cost of an Armor Plant and Armor Making.

Report of the Investigation by the Special Naval Board.

WASHINGTON, D. C., November 11, 1906.—The Secretary of the Navy has received the report of the special board appointed pursuant to act of Congress to make an investigation as to the cost of an armor plant and of the production of armor plate. The board was composed of Capt. Kossuth Niles, Commander Walter McLean and Lieut.-Commander Edward Simpson, and received its instruction from the Acting Secretary of the Navy on May 11 last, having occupied the time since that date in a very exhaustive inquiry. Through the courtesy of Admiral Mason, chief of the Bureau of Ordnance, the correspondent of *The Iron Age* is enabled to present an abstract of this interesting report.

Prices Paid for Armor.

After describing in detail the inauguration of armor plate manufacture in the United States and giving a brief history of the various contracts made by the Government with the three companies now producing armor, the board presents the following table showing the prices paid by the leading countries of the world for all types of armor and the maximum price paid for Krupp armor:

	Average of all armor. Per ton.	Krupp armor. Per ton.
Japan	$400	$400
Austria	449	557
Italy	521	550
Germany	450	450
France	569	572
England	626	681
United States	345.92	346

The board's information indicates that the manufacturers of this country are practically alone in demanding of the home government no greater and even lower prices for armor than those charged to foreign purchasers. Very generally abroad home prices rule higher than those to foreign customers. In 1894 the Bethlehem Iron Company made a contract with the Russian Government for about 1500 tons of armor at a much lower price than was then charged this Government. It was claimed that this contract was taken without regard to cost for the purpose of gaining a foothold and recognition in the Russian market. This contention is borne out by the prices made by this company and by the Carnegie Company in later contracts with the same Government, which were at figures from $100 to $150 per ton above those at that time charged the United States.

Cost of an Armor Factory.

The board accepts and adopts the report of the Armor Factory Board of 1897, as giving the details of its own conclusions in regard to the cost of an armor plant. This report is most elaborate in detail, and considering the recognized technical ability of the officers composing the board and the facilities at its command in making its investigation it is deemed unnecessary on the part of this board to attempt an elaboration of that report, and its comments thereon are of a general nature only.

The inclusion in any armor factory of an open hearth department for the production of its own ingots the board deems essential for economic reasons, as well as those of practical operation. Any scheme for the purchase of armor ingots from outside steel works, as has been tentatively proposed in certain hearings upon this question, the board deems altogether unfeasible. The designed output of 6000 tons per year proposed by the Armor Factory Board should be adhered to, but the details of equipment necessary to that output may, from a present day view, require minor modification.

Cost of Private Armor Plants.

The statement furnished the board by the Midvale Steel Company as to the cost of its armor plant shows that it has expended thereon somewhat in excess of $3,500,000, but explains that the amount is not accurately stated because of the transfer to armor plant of certain tools installed previous to its entering the field of armor making and to the further fact that certain other tools that might fairly be classed as of the armor plant are not exclusively used in that plant. The company further states that this estimate does not include the value of the ground occupied or interest on the construction investment, but does take account of the cost of designing and superintendence.

The figures furnished by the Bethlehem Company show that it estimates to have originally expended in the development of its existing armor plant $4,625,000, inclusive of the cost of the land occupied, designing, interest on investment (until productive), and the proportionate part of the rest of its plant devoted to armor making, but exclusive of a large sum, generally conceded to be about $500,000, expended in acquiring information, drawings, patents, &c., to enable it to start armor making. In addition to this cost of the plant as it now stands, there has been an estimated expenditure of about $1,000,000 for furnaces, machines, &c., that have been replaced by improved appliances, making the total estimated investment in armor plant alone $5,625,000.

The Carnegie Company estimates its total investment in armor plant at $5,905,425. This estimate includes $4,730,425 as the actual cost of construction in armor plant since its commencement, as shown by the books of the company, and $1,175,000 as the allowed cost of the land occupied, the designing, superintendence and interest on investment for the original plant and later additions thereto, and the proportionate part of property and facilities attached to other departments of the works that is employed in connection with armor plate production.

In addition to the figures furnished the board by the armor plate manufacturers, estimates were also submitted by the Government inspectors of ordnance on duty at the three plants now engaged in making armor. One of the inspectors gives without detail $3,500,000 as a conservative cost of an armor plant of about 10,000 tons yearly capacity. A second estimate is $3,875,000. A third estimate is in elaborate detail, and is based on observation and general knowledge and inquiry, together with details supplied by the companies. This estimate is $4,339,271, including all costs incidental to the establishment and equipment of one of the existing plants and taking cognizance of that part of the plant that is common to the connected works. Taking all these estimates into account and giving careful consideration to the report of the Armor Factory Board, this board believes that the total cost of an armor plant, not including the cost of land occupied, nor any allowance for interest on constructing capital, should be in round figures $3,750,000.

Cost of Making Armor Plates.

For obvious reasons each armor making company has declined to give to the board any figures as to the actual cost to it of armor production. The Midvale Company deemed that its interests demanded that it decline any discussion, however broad, of this feature of the board's labor. The officers of the Carnegie Company freely discussed this point with the board, and disclosed to it a great number of the details whereby an estimated cost is derived by that company. From the Bethlehem Company the board received in great detail a formula whereby the cost of production might be derived with all practicable accuracy. This formula has been of marked value in pointing out the numerous features that the board should consider in its estimates.

The board has deemed it proper to consider the cost of armor plate as under two heads, which it designates as the production cost and the full cost, respectively. As entering into the production cost, the board has considered those items that in a general way may be said to be entirely, or very largely, without the control of the makers. They include the price of all raw materials, the cost of labor, the cost of the up keep of the plant, the current repairs, the salaries paid the necessary superintendent forces and the interest on the working capital.

In order to obtain the full cost of armor plate to any private concern, there must be added to the production cost a proportion of the general administrative expenses of the whole works—taxes and insurance on the plant and a host of general miscellaneous expenses that cannot readily be itemized. Then, too, changes in the processes of manufacture may require the installation of new equipment, so that it is proper that a further charge be added making provision for such a general depreciation of the plant as distinct from the current wear and tear provided for in the maintenance charge under production cost, and that recognizes the possible total abandonment of the plant through a lack of demand for armor or by reason of the discovery of some superior and radically different method of production.

A yearly production of 6000 tons at full capacity and the purchase of all raw material in the open market have been assumed throughout the estimates. In the matter of power used, both steam and electrical, estimates are based upon observations of the total outputs of the central generative stations at existing plants, and a proportionate part of this total has been arbitrarily assigned to the different steps of manufacture. This estimate of power expended includes that for the lighting, running and heating of buildings as well as that for all other purposes. In the matter of transportation, which is made to include moving and handling of the charges, the moving of ingot and plate to and from various places of manufacture and the handling of stock, coal, ashes, slag, &c., an estimate has been made of the total cost of the combined transportation facilities used and the same arbitrary assignments made to the various steps.

The Detailed Estimates.

In calculating the cost of armor plate, the board begins with the making of the ingot designed to produce plates exceeding 5 in. in thickness, known as Class A armor, and presents the following table showing the items of expense:

Cost of Ingot.

Furnace charge:	Tons.	Value.
Pig	24.3	$437.40
Nickel scrap	30.38	1,458.24
Metallic nickel	1.04	931.84
Ore	1.00	5.00
Additions	2.24	459.20
Flux	6.00	9.00
Total charge	64.96	$3,300.68
Flux	6.00	.....
Metal in charge	58.96	$3,300.68
Furnace loss (8 per cent.)	4.72	.....
Metal poured	54.24	$3,300.68
Fuel consumed in melting		$66.50
Material consumed in melting		6.50
Repairing and preparing furnaces; preparing charge, charging and pouring—labor		92.11
Repairing and preparing furnaces; preparing charge, charging and pouring—material		16.24
Preparing ladles and mold—labor		96.50
Preparing ladles and mold—material		17.50
Metal poured	54.24	$3,596.03
Pit scrap (7 per cent.) recovered	3.80	144.40
Ingot in pit	50.44	$3,451.63
Lifting mold, stripping and chipping ingot	...	21.00
Power (steam, electric, water)	...	27.00
Transportation (proportion)	...	78.80
Superintendence (armor) (proportion)	...	7.92
Superintendence (O. H.) (proportion)	...	6.72
Drafting (proportion)	...	2.50
Inspection (proportion)	...	1.50
Laboratory (proportion)	...	19.88
Ingot in forge	50.44	$3,616.95

Following is a statement of the cost of the various items of the forging process:

Forging.

	Tons.	Value
Ingot at forge	50.44	$3,616.95
Ingots condemned (5 per cent.)	2.52	.....
Ingots forged	47.92	$3,616.95
Metal in condemned ingots recovered	...	95.76
Ingots forged	47.92	$3,521.19
Ingots forged into condemned plates (5 per cent.)	2.40	.....
Ingots entering shipped plates	45.52	.....
Metal recovered from condemned plates	...	86.40
Ingots entering shipped plates	45.52	$3,434.79
Oxidation and scale (3 per cent.)	1.37	.....
Slab	44.15	.....
Labor for forging	...	97.85
Material	...	15.80
Fuel and labor	...	112.50
Repairs	...	40.00
Electric power and lights (proportion)	...	37.42
Steam (proportion)	...	386.53
Drafting (proportion)	...	2.50
Inspection (proportion)	...	1.50
Superintendence (proportion)	...	23.76
Laboratory (proportion)	...	19.88
Transportation (proportion)	...	52.52
Slab	44.15	$4,225.05
Discard (37 per cent.)	16.34	.....
Plate for carbonizing	27.81	$4,225.05
Discard recovered	...	620.92
Plate for carbonizing	27.81	$3,604.13

It is estimated that 5 per cent. of ingots are imperfect and not forged. The value of these ingots for remelting covers the cost of handling and cutting them up and their redelivery at the furnace. The 5 per cent. allowed for ingots entering plates later condemned covers all plate losses throughout manufacture, and the value assigned the recovered metal allows for its handling, cutting up and later delivery for remelting, as well as for all losses by oxidation and scale, and the labor expended up to the point of rejection.

The cost of carbonizing, scaling and treating is given as follows:

Carbonizing, Scaling and Treating.

	Tons.	Value.
Plate for carbonizing	27.81	$3,604.13
Oxidation and scale in treatment (3 per cent.)	0.83	.....
Plate for treatment	26.98	$3,604.13
Labor	...	187.73
Material	...	20.00
Fuel	...	78.75
Repairs	...	48.12
Steam (proportion)	...	4.94
Electric power and lights (proportion)	...	37.42
Drafting (proportion)	...	1.25
Inspection (proportion)	...	1.50
Superintendence (proportion)	...	31.65
Laboratory (proportion)	...	29.82
Transportation (proportion)	...	52.52
Treated plates	26.98	$4,097.03

While the carbonizing, scaling and treatment (heating water hardening and annealing) of plates are distinct processes, they are so connected that estimates have been made of the combined processes. The cost of bending and rectifying is given as follows:

Bending and Rectifying.

	Tons.	Value.
Treated plate	26.98	$4,097.83
Labor	...	45.25
Material	...	25.00
Repairs	...	45.91
Fuel	...	12.00
Plate rectified	26.98	$4,225.99

The repairs mentioned in the above estimate are those made to the bending press and connecting engines in pumps. The fuel is that consumed in the direct fired furnaces serving the bending press. Following is a statement of the cost of machining and erecting:

Machining and Erecting.

	Tons	Value.
Plate rectified	26.98	$4,225.99
Machine scrap (26 per cent.)	6.98	.....
Plate for machining	20.00	$4,225.99
Metal received from machine scrap	...	321.08
Plate for machining	20.00	$3,904.91
Labor	...	318.60
Tempering, repairing and renewing tools	...	40.00
Oil, waste and grinding disks	...	10.00
Repairs	...	19.12
Water supply	...	5.00
Steam (proportion)	...	51.38
Electric power and lights (proportion)	...	37.42
Transportation (proportion)	...	26.25
Inspection (proportion)	...	1.50
Drafting (proportion)	...	3.75
Superintendence (proportion)	...	10.00
Laboratory (proportion)	...	9.94
Machined plate	20.00	$4,437.87

The machine scrap herein estimated includes an allowance for all recovered losses of manufacture and other

provided for, and the value assigned to the metal recovered for future use includes that of any useful scale or other metal recovered and not previously included in the estimates, and covers an allowance for the cost of all necessary handling and storage.

The charges against this step of manufacture, other than the proportions given, are based upon calculations of observed outputs of the machine shops of the existing armor plants that have included plates of varying shapes. An allowance has been made, too, for the cost of machining special materials and shapes, such as sight hoods, conning tower and ammunition tubes, tap bolts and armor bolts.

The proportional charges noted are, as heretofore, arbitrary assignments to this step of a part of the calculated outputs or services of central plants or offices.

Shipping.

	Tons.	Value.
Machined parts	20.00	$4,437.87
Labor and material	...	10.00
Shipped plate	20.00	$4,447.87

The labor and material here charged cover the painting of the plate, the plugging of bolt holes and other preparations for its shipment.

From the cost of shipped plate thus derived is obtained the cost per ton of shipped plate, to which are added further charges per ton for interest on the working capital involved, and for the general upkeep or maintenance of the plant, in order to arrive at the production cost per ton. The working capital needed for 6000 tons yearly output is assumed as $750,000, on which interest is allowed at 5 per cent. The maintenance charge added is for the general upkeep of the whole plant, such as general repairs to buildings, roadways, equipment, &c., and is distinct from the current repairs necessary to keep the plant in working order charged under each step of manufacture. The amount of this charge is taken as 2½ per cent. of the assumed value of the whole plant, which is $3,750,000.

Production Cost.

	Tons.	Value.
Shipped plate	20.00	$4,447.87
Cost per ton of shipped plate		$222.39
Interest on working capital, per ton		6.25
Maintenance of plant, per ton		15.63
Production cost, per ton		$244.27

The production cost of class B armor, which includes all plates of less than 5 in. in thickness, is slightly less than that of class A armor and figures out at $221.76 per ton.

It should be noted that in these estimates the use in the furnaces of coal produced gas has been assumed. In any locality where a supply of natural gas is to be had the fuel charge would be markedly reduced, probably, the board believes, by 16 per cent.

Full Cost.

To the production costs thus arrived at the board estimates that charges per ton as follows must be added to obtain the full cost:

Administration	$3.74
Miscellaneous expenses	1.00
Taxes	1.56
Insurance	1.57
Depreciation	43.75
Total additions	$51.62
Production cost, Class A	244.27
Full cost, Class A	$296.89
Total additions	$51.62
Production cost, Class B	221.76
Full cost, Class B	$273.38

Analysis of Estimates.

The administration charge allowed includes the salaries of the officers of the company and the clerks employed in the general offices and various departments, as the financial, accounting, sales and purchasing departments; the salaries of the general superintendent of the works and others connected with the executive office, and all such expenses as enter into the general administration of an armor factory. This charge, as determined by the board, is based upon assumed conditions in existing armor works, but necessarily the estimates are unconfirmed by any exact knowledge. While an essential charge in any private armor making concern, this element of the full cost would be largely eliminated in any Government factory, where, no doubt, the armor superintendence would be extended to all necessary general administrative duties. In such cases, though, the charge for such superintendence would need to be considerably increased over that herein provided for under production cost.

The miscellaneous expense charge includes such items as office supplies, telephone service, telegraph and postage charges, travel, general expenses and a contingent fund. In these general expenses and contingent fund charges the board has given consideration to a provision for legal services, experimental work and investigations, an accident fund for the settlement of accident liability, the hospital expenses of injured employees, and a number of other such like charges that must be provided for in all private concerns. While the board has endeavored to give consideration to all the detailed elements, it is believed should enter into this miscellaneous expense charge, it has not attempted to assign a definite value to each element, but has estimated a lump sum that it believes should cover their total cost. Only a part of this miscellaneous charge would, of course, be provided for in the administration of a Government factory.

Local conditions and the policy of any particular company so control the amount of taxes levied and the insurance carried that the board in these charges has done no more than to more or less arbitrarily assume figures that would seem to cover average conditions. These charges would not obtain with a factory under Government ownership.

The depreciation charge is an allowed percentage to provide for a periodic replacement of existing equipment and for the gradual obsolescence of the plant caused by any improvement in processes of manufacture or in design of machinery. The board has likewise considered in the estimate a possible total abandonment of a private works in so special a line as armor plate manufacture, due to the cessation of any demand for its product.

This depreciation charge pertains largely in private plants, where trade competition makes it necessary that the latest and most improved equipment only be installed in order that such competition may be successfully met. A notable example of the obsolescence and necessary abandonment of equipment is found in the 125-ton hammer originally installed by the Bethelehem Company. This expensive installation was early superseded, while still in perfect condition, because of the recognized superiority of armor forged under hydraulic presses.

Cost Dependent on Output.

The board desires to emphasize the fact that its estimates herein have been made on an assumption of an output about equal to the full capacity of the supposed producing plant—the most economical condition of production. As an illustration, however, of the uncertainties involved in armor making and of the effect on the cost of it of a deficiency in the amount demanded, the latest contracts with the Bethlehem and Carnegie steel companies may be quoted. Prior to 1902 the combined full yearly capacities of these two plants were rather less than 10,000 tons. During that year an urgent but temporary demand for armor delivery made it necessary that both plants be greatly extended, and their combined capacities were then increased to, and now are something over 20,000 tons.

The total award of armor under the latest contracts with these companies is approximately 3600 tons, and this represents the entire Government armor work these companies will have in hand during the next calendar year. The expenses of the plants during this year must in consequence be distributed over an amount of armor that is no more than a normal two months' output of these two plants, and its cost to each per ton must, therefore, be out of all proportion to what it would be were their plants working continuously at full capacity.

W. L. C.

The report of La Société John Cockerill, Seraing, Belgium, for the last financial year shows a net profit of £74,250. A dividend of 70 francs a share was declared, equal to 14 per cent.

The Mechanical Engineers' Convention.

The twenty-seventh annual meeting of the American Society of Mechanical Engineers opened Tuesday evening, December 4, as reported in the last issue, with the presentation of the president's address on the "Art of Cutting Metals." An abstract of Part I of this paper was printed last week, and elsewhere in this number will be found a continuation of the matter. The opening session and all of the succeeding ones were held in the auditorium of the Edison Building, 44 West Twenty-seventh street, where the headquarters were maintained throughout the convention. It was a disappointment to many that the original intention to hold this meeting in the new Engineering Building was defeated by inability to have the building in readiness. An opportunity, however, was given the out of town members to inspect the building Wednesday afternoon.

THE SECOND SESSION

convened Wednesday morning at 9.30. Following announcements by the secretary concerning excursions and inspection trips to places of engineering interest the customary business was taken up at this session. Among the invitations which were given to visit power plants was one from the Allis-Chalmers Company to see in operation the turbine which it has installed in the Edison Illuminating Company's plant in Brooklyn. There was also an invitation from Henry Stott, superintendent of motive power of the Interborough Rapid Transit Company, to inspect that company's power plant.

A report was submitted for record of the business transacted by the council and passed without discussion. There was also then given the report of tellers on the election of members.

Report of the Committee on Standard Proportions for Machine Screws.

Over a year ago a committee was appointed to consider the standardization of machine screw proportions. The screws considered by the committee have been those used in large quantities by large manufacturers, and are of the class made from screw gauge wire and having the heads formed by pressure. They run up to 0.375 in. in diameter. In the drafting of the report the committee has had the assistance of some of the largest manufacturers, as well as some of the largest users, of screws of the sizes considered. The report was first presented at the Chattanooga meeting, but owing to the importance af the subject the discussion of the report was ordered continued at a session of the annual meeting. This report was not finally submitted at this time, inasmuch as further recommendations have been made by manufacturers which it is desired to embody and which could not be considered by the committee in time. A presentation of the committee's conclusions and recommendations will be deferred in these pages until the final report has been adopted by the society.

The amendments to the constitution, which were proposed at the Chattanooga meeting last May, concerning the appointment of an honorary secretary at the discretion of the council, and providing for a standing "Research" Committee, were again read at this meeting, as required by the constitution, and passed without further discussion. These will be submitted to the membership for mail balloting in regular order.

During the discussion of the president's paper which followed Vice-President Barrus took the chair. The first speaker was Henry R. Towne, who had submitted a written discussion, and paid the paper a high tribute. He considered it the most important paper ever presented to the society, and congratulated the president on the throughness of the investigation, mentioning the features of the development of the author's system of shop conduct, form of tools, use of belts, &c. Calvin W. Rice, commenting on the paper, told something of the experiences with the Taylor system, which had been had at the Sayle's bleachery. D. Adamson of Hyde, Cheshire, England, referred to the investigations which were made in Manchester on high speed steels, of which mention was made in the paper. Mr. Adamson desired to make some corrections in connection with the references to the Manchester experiments. The report of the Manchester committee's tests was published by the Manchester Association of Engineers in its 1903 Transactions. The paper referred to by Mr. Taylor was published in the Transactions of the American Society of Mechanical Engineers for 1904, and was a later and individual effort on the part of Dr. Nicholson. Mr. Adamson also asked further details concerning Mr. Taylor's work. Another comment from Vicker Sons & Maxim, Sheffield, England, contained something from their own experience, and also asked further information of the author of the paper. The conclusions arrived at by Mr. Taylor confirmed generally their own experiments and experience. John C. Hawkins praised the paper in high terms, but suggested that skilled workmen would cease to be of importance with the introduction of the Taylor system, mentioning this as a possible disadvantage. Mr. Taylor objected to this, and stated that "finger-wisdom," so-called, is not lost where this system is in force, in substantiation of which he had a number of men at the convention who he considered were representative types of skillful and intelligent workmen, who had suffered nothing from working under the system. Fred. M. Osborne, Sheffield, England, connected with the firm of Samuel Osborne & Co., referred to Mushet steel, the rights to which were taken over by that company, and stated that the Taylor-White improvements should be regarded more as a development in the process of the heat treatment than any change in the mixture. M. H. Le Chatelier, Paris, France, commented on such phases of the paper as were familiar to him. Prof. L. P. Breckenridge expressed his thanks for the mention given of his work at the University of Illinois, and remarked that they realized then, and more so now, the insignificance of their work, compared to that undertaken by Mr. Taylor. Another discussion from abroad was submitted by Dr. J. T. Nicholson, and refuted what he regarded as condemnation of the Manchester experiments, believing the criticism somewhat severe. He, however, thanked the author for the great amount of information contained in the paper, and thought all engineers, and especially those concerned with the practical side of the art of cutting metals, owe a debt of gratitude to Mr. Taylor and the men associated with him for the pioneer discoveries they have made in connection with tool steel. H. C. H. Carpenter, Manchester, England, gave it as his opinion that the paper was one of the most remarkable practical researches ever conducted, and offered a few corrections. H. K. Hathaway referred to difficulties in instituting the Taylor system of feeds and speeds, citing his own experience. He believes, however, that the system pays. M. Codron, Paris, France, congratulated the author on the paper and the work it covered. He outlined his own work on shearing, boring and other metal cutting, which will shortly be presented through the technical press. H. L. Gantt gave his views on task management. Mr. Gantt is one of those who have been connected with Mr. Taylor in the work referred to in the paper.

Oral discussions, that is, those not previously submitted in writing, were offered by the following: Oberlin Smith, who gave his experience with electrical drive, showing that the old belief that short belts and small arcs of the contact were not allowable is in danger of being exploded. He has used them himself with much success. W. S. Huson made a few remarks which applied to finishing cuts and accurate work. He suggested that contributions on light work would be valuable to supplement Mr. Taylor's work on high speed and roughing cuts. J. M. Dodge briefly commented on the paper deploring the use of the word "task" for the work as assigned to each individual workman, because, as a matter of fact, the task is not harder than before, and a man's work is really lightened although the output is increased. Prof. William Kent suggested that the word "stunt," popularized by college slang, would not be an inappropriate term in place of task.

In summing up, Mr. Taylor, in speaking for himself and his colleagues, stated that they were almost overwhelmed by the attention that the work had received. The greatest object of the work was the increasing of wages 30 per cent. or so, and at the same time the output 50 to 100 per cent. Mr. Taylor was sorry that Nicholson and Adamson misunderstood the criticism made of their work, as there was no intention of speaking slightingly of it. He still maintained it as his belief, however, that they took too many variables in their calculations and expected to obtain scientific results where they were impossible. He also corrected the erroneous impression that high speed is not applicable to all branches of work, stating that it is quite possible to use it in anything, from locomotive work to printing press work. All that is necessary is a determination to study the problem with the intention of expending money or time if necessary to accomplish results.

THIRD SESSION.

The papers presented Wednesday afternoon formed a class by themselves, designated as "Power Plant Symposium." These mainly pertained to matters of interest to those concerned with power plants, the first being

"The Evolution of Gas Power,"

by F. E. Junge, Berlin, Germany, member of the Verein Deutscher Ingenieure. An abstract follows:

It is the object of this paper to give a brief survey of the course of development and the extent of application which the gasification of fuels and their direct transformation into energy in gas engines has found up to this date. Since it is difficult to do justice to so comprehensive a subject and to detail all the various phases of its growth, at the same time dwelling on the constructive principles of the various apparatus employed in the process of gas power generation, this paper is confined merely to the elaboration of European achievements, and of these only the very latest thought is advanced.

In the introductory part, the importance of fuel conservation as an economic national and international aim is considered. The first section is devoted to considerations on the present working cycles of gas engines and their probable future modification, and to the criticism of what is now regarded as the standard type. In the second part the development of the gas producer is discussed, and its present deficiencies and the path of future improvements outlined. The third part is concerned with the application of gas power in the different commercial pursuits, and in the varied industries—including reference to the present aspect of the struggle between the small independent producer on the one hand and the large electric central stations and gas companies on the other—and also its application in agricultural pursuits, and as motive power for the propulsion of vessels. Where, owing to limitations of space, it was found impossible to enter into details, reference is made to standard works or other treatises of literature, which serve to bear out the correctness of statements made or to enlarge upon the information presented.

Commenting on this paper, Prof. R. C. Carpenter of Cornell University recited some facts concerning Brayton's work on gas engines, and stated that Brayton is entitled to a prominent place in the development of gas engines, and recent investigations indicate that his cycle is likely to be extensively used in the future. Professor Carpenter pronounced the author's paper valuable, as it calls attention briefly and concisely to the principal epochs in the development of the internal combustion engine and to characteristics and advantages of various cycles invented from time to time..

W. D. Ennis discussed efficiencies, comparing steam and gas engines. It was his belief that what we need in both boiler and engine practice is not record breaking efficiencies so much as a nearer approach to these in ordinary plant operation. R. E. Hellmund deplored the disinclination on the part of electrical engineers to adopt gas engines and explained why. In the last five years gas engines have been so much improved that now many objections to them have been removed. Gas engineers, it is his opinion, should work together with electrical engineers to the end of producing an engine better adapted to this particular line of work. J. E. Johnson threw some additional light on the use of gas engines in connection with blast furnaces. He believed that ultimate development will be along Diesel lines, and took exception to the statement in the paper that gas engines in connection with blast furnaces have an advantage of 3 to 1 over steam. Certainty of operation is too important to admit of taking chances, therefore the commercial standpoint is altogether different from the scientific. He defended the attitude of metallurgists and warned against a too hasty turning to gas. G. H. Rathbun offered reasons for considering the author a little too severe in considering the range of economical load of gas engines so limited. He predicted that gas engine efficiences at maximum loads will be greatly improved. Prof. R. H. Fernald commended the paper and gave some data that he could not give one year ago when he presented his own paper on "Results on the Preliminary Producer Gas Tests of the United States Geological Survey Coal Testing Plant at St. Louis," and showed various charts pertaining to the calorific value of fuels. Another speaker added a little on foreign experience in Germany, France and Belgium, particularly on the use of compression in gas engines, by which the mean effective pressure is increased. In smelting work in Germany 40 out of 50 concerns are using gas instead of steam, or have ordered gas engines, and many of these are of very large size. Prof. C. E. Lucke thought the paper gave too high an opinion of gas power. He believed it should be discussed only in connection with engines of large size, as comparison between steam and gas engines becomes more difficult in large sizes. Theoretically, gas offers superior advantages. Steam engines have been designed for the particular service required of them; but this is not true of gas engines at the present time. Commercially there are other considerations than merely efficiency.

The second paper of the morning, subject,

"Producer Gas Power Plant,"

was presented by the author, J. R. Bibbins of the Westinghouse Machine Company, Pittsburgh, Pa., and was printed with illustrations in the last issue of *The Iron Age* (December 6, 1906).

Regarding the use of the term "loading factor" in the author's paper, W. D. Ennis suggested "capacity factor" as better, since there are sometimes occasions to consider also the relation of peak load to rated capacity. He suggested, therefore:

Load factor = average load : peak load.
Capacity factor = average load: rated capacity.
Peak factor = peak load : rated capacity.
Load factor × peak factor = capacity factor.

"Steam Turbine Characteristics,"

by Hans Holzwarth, Hamilton, Ohio, was the next paper, an abstract of which follows:

Indicator diagrams of reciprocating engines are "characteristics" of engines. Are there similar "characteristics" for turbines? Engines have consecutive cycle processes, turbines open expansion process, in multiple expansion turbines, composed of a multitude of part processes. General expansion law is $p \times v^n$ const. Algebraic computations with this law are self-forbidding for the engineer. Graphical interpretations, common p — v diagram, of this law are also very inconvenient. The logarithmical p — v diagram is much more convenient. Available energy L per 1 kg. steam, $L = 35{,}000 (\log p - \log p_0)$ for $p_0 = 0.1$ kg-cm² and $L = 40{,}000 (\log p - \log p_0)$ for $p_0 = 1.0$ kg-cm, is directly represented in the logarithmical diagram by the hight of expansion trapezium. Equal part expansions are represented by trapeziums of equal highes. Then follow conclusions that can be drawn from a logarithmical diagram which makes it especially valuable for the engineers; among these are the influence of changes in initial and exhaust pressures, singly and simultaneously; question of overloading steam turbines, &c. This influence of throttling steam and superheating the moisture of steam is demonstrated with Mollier's I.-S. diagram. Also the turbine's advantage of good economy over wide load ranges against that of reciprocating engines.

Specific Examples: Showing influence of throttling steam and dropping vacuum upon the output and economy of the turbine, normally designed for 10 kg.cm²abs. initial and 0.1 kg.cm²abs. exhaust pressure.

Ten wheels each 7 in. mean diameter, making 3600 rev. per min., give an available energy 70,000 mkg.; 7000 mkg. for each wheel.

With 1 kg. steam per second the total output is 543 b.h.p., rotation losses and bearing friction not deducted, or 6.65 kg. steam per b.h.p. hour.

A normal condition: (1) Initial pressure reduced from 10 kg.cm²abs. to 5 kg.cm²abs.; available energy 61,800 mkg.; then 0.5 kg. steam per second only can pass. Total output will be 245.8 b.h.p.; economy 7.3 kg. b.h.p. hour; 10.6 per cent. more than normal.

(2) Vacuum drops from 27 in. to 20 in.; available energy 52,000 mkg.; 1 kg. steam can pass per second. Output will be 414.2 b.h.p.; economy 8.7 kg. per b.h.p. hour, or 31.8 per cent. more than normal.

Capt. H. Riall Sankey submitted a discussion of the

paper, in connection with which he used a chart giving his idea of a steam turbine characteristic.

"The Design of An Improved Boiler Setting"

was the subject of the next paper, by A. Bement, Chicago, Ill. This paper was also printed in abstract in last week's issue.

The experience of Prof. L. P. Breckenridge confirmed that of Mr. Bement that tile roof furnaces, with chain grate stokers, appear to be the most satisfactory combination for burning many grades of Western bituminous coals without smoke and with good economy. It fills the primary requisite that hot gases must not come in contact with cold tubes or plates if smoke is to be prevented. He believed that stokers and boilers should be made by the same manufacturer to secure best results. At present one boiler builder claims any stoker may be used and the stoker maker that his stoker will work with any standard boiler. W. D. Ennis commented on his own experience in endeavoring to harmonize minimum size of gas passages with sufficient boiler heating surface, and indorsed the use of retarders, such as those of tile, referred to in Mr. Bement's paper. Prof. William Kent considered the proposed setting a long step in the direction of smokeless combustion and of maximum absorption of heat by the heating surface of the boiler. The regular feeding of coal by automatic stokers and long travel of gases under the firebrick roof are the two most important features tending to smokeless combustion. He suggested adding to Mr. Bement's design provision for an adjustable supply of air, which could be admitted whenever the rate of feeding coal is increased enough to cause of the production of smoke.

A. A. Cary analyzed the combustion of bituminous coal in furnaces and defined ideal conditions and the form of furnace most suitable. He likened Bement's design to a Heine furnace in connection with a Babcock & Wilcox boiler, and criticised the sudden enlargement of the furnace at the rear. Prof. E. A. Hitchcock gave his experience with Hocking Valley pea and slack coal in boilers of horizontal water tube type, with the tubes tile-inclosed and with inclined grate automatic stokers. He obtained very nearly smokeless combustion. A discussion by Embury McLean described the balanced draft gas producer furnace, giving essentially the matter contained in a paper presented by him before the Brooklyn Engineers' Club and printed in *The Iron Age* September 13, 1906.

"The High Duty Air Compressor,"

by Prof. O. P. Hood, Houghton, Mich., was the subject of the next paper, which is given in the following abstract:

The object of this paper is to put on record the results of a test of a high duty engine used in connection with an air compressor. The engine is quadruple expansion, uses steam at 250 lb. pressure and is provided with a feed water heating system which obtains a large credit of heat from the engine to return to the boiler. The duty of the engine per million heat units, based on the indicated work, is 194,930,000 ft.-lb.

The heat used per hour per indicated horsepower is 10,157 B.t.u., establishing a new record for a steam engine 9 per cent. below the best previous record. The thermal efficiency of the engine exceeds 25 per cent.

In this engine the weight of steam sent to each of the four successive cylinders is a continually decreasing amount due to steam withdrawn during expansion for purposes of feed water heating, and the paper indicates a method of discovering the several subtractions without interfering with the action of the peculiar feed heating system. This method is applied and an approximate distribution of the heat used by the engine is shown diagrammatically.

George H. Barrus criticised the system described as having no advantage when carried to the extreme limits indicated in the paper, and believed it wrong to heat the feed water with steam when the boilers had economizers, since it robbed the engine of power. Professor Carpenter stated that the test made by the author served to indicate a distinct improvement in engine construction made by the Nordberg Mfg. Company during the last six years, and accredited Bruno Nordberg, one of the greatest engineers of this or any other age. He lamented the absence of more data in the author's paper on the construction and operation of the air compressor which the engine drove.

The next paper had for its subject

"The Steam Plant of the White Motor Car,"

and was presented in abstract by Prof. R. C. Carpenter of Cornell University, Ithaca, N. Y.

This paper describes the construction and mode of operation of the steam plant of the White car. It gives a detailed description of a series of tests made on the engine and boiler of the car of 1907, and also the results of a test made by Professor Benjamin on the engine and boiler for the 1904 car.

The steam plant of this car is designed to use steam of high pressure and of a high degree of superheat, and the tests were conducted with boiler pressure of about 600 lb. per sq. in., and with steam superheated about 300 deg. F. The engine of the car is a compound noncondensing engine and showed a steam consumption with the best load during a test of slightly less than 12 lb. of steam per brake horsepower, and a fuel consumption of practically 1 lb. of gasoline per brake horsepower. The thermal efficiency, on the basis of heat supplied and work performed, is about 13 per cent., which is very high for a compound steam engine with cylinders 3 x 6 x 4½ in.

In reducing the results the tests of the values of the specific heat of superheated steam recently obtained in Sibley College were employed, which results are given as a portion of the paper.

The author believes the paper is of considerable importance in pointing out a practical method of using steam of high pressure and of a high degree of superheat, and he is further of the opinion that if the steam engine is to maintain its supremacy as a power producer, in competition with internal combustion engines, that improvement must be along the line of producing and using steam with high pressures and a high degree of superheat.

Prof. C. C. Thomas, referring to the author's curves for values of the specific heat of superheated steam, which were taken from experiments made last year with apparatus designed by himself, stated that they do not regard these results as final yet. They are probably substantially correct, but their acceptance should be held subject to the results expected from the present continuation of the investigation. He described his apparatus and the method of using it. W. S. Johnson referred to his own experiments with a single tube water tube boiler of different construction, wherein he obtained practically the same evaporation as that mentioned in the paper.

FOURTH SESSION.

"A Plan to Provide for a Supply of Skilled Workmen,"

by M. W. Alexander, Lynn, Mass., was the first paper presented Wednesday evening. The papers given this evening were originally scheduled to be presented Friday morning, but owing to the fact that Friday's excursion would require all day they were put forward to Wednesday night, an otherwise unassigned period. The following is an abstract of Mr. Alexander's paper:

It is generally conceded that the development of American mechanical industries is endangered by an insufficient supply of skilled workmen. The reason for this may be found in the enormous expansion of these industries in recent years which has made the demand for skilled workmen greater than the supply; and in the great specializing tendency in all industrial activities, in consequence of which manufacturers have not paid sufficient attention to the training of all-round skilled artisans. The plan outlined in this paper deals with the manufacturer's side of the problem and describes a modern apprenticeship system, successfully developed by the General Electric Company at West Lynn, Mass. This system was evolved after a study of the prevailing systems, and it aims to overcome what the author considers their weaknesses.

By the plan adopted apprentices are kept in the training room for about two years under expert instruction on commercial work, especially selected from the whole work in the factory. They are then sent into the factory department for the remaining two years of the course in order to acquire greater speed and skill on a larger variety of work. So far two training rooms have been established; one for machinist and tool maker apprentices with about 10,000 sq. ft. of floor space and about 105 representative machine tools, and a smaller one for wood and metal pattern maker apprentices with a floor space of about 1000 sq. ft. A training room for foundry apprentices has not yet been found necessary on account of the small number of such apprentices so far indentured.

A special school is conducted, in connection with the apprenticeship work, in which the elementary and some of the more advanced sciences are taught in a practical way in their application to everyday factory life. Engineers, draftsmen and foremen of the company who possess the necessary qualifications act as instructors in this school, which is in session during a part of the regular working time.

This paper endeavors to prove the feasibility of establishing similar training rooms and lecture courses for much smaller concerns; a common training room for several small factories in a locality; and, finally, an independent and self-sustaining training room—a new and practical trade school for the benefit of the industries of a community. The paper then considers the other element in providing for a constant supply of skilled workmen—*i.e.*, the possibilities of making skilled specialists, and eventually

of developing unskilled workmen into skilled artisans. It suggests that the factory be utilized for this purpose during evening hours. The training room is shown to be especially suited for this industrial educational extension work.

The successful working out of these ideas by manufacturers quite universally would go a long way toward overcoming the lack of skilled labor. At the same time, the State could gain from these practical efforts valuable information as to the establishment of proper trade schools necessary for the complete solution of this industrial problem.

In discussing this paper, President Taylor stated that he believed that the Germans are ahead of us in instructing their workmen, and hoped that our trade unions might become instrumental in such work in time. He declared that the work of this sort done by the Baldwin Locomotive Works and the General Electric Company is most commendable, and supplementary to Mr. Alexander's paper refers to his own on shop management printed in the transactions for 1903. In his system, wherein functional foremen are a part, each one does one-eighth of the work of an ordinary foreman, and can train men under him. This system, he states, is quite as applicable in a small shop as in a large one. In his discussion, H. K. Hathaway described the Taylor plan. The factors in the organization are the gang boss, speed boss, inspector, shop disciplinarian and the functional foremen, and in this discussion were outlined the duties of each. It has been found that under this system about 100 per cent. more work is now done than was formerly possible. Mr. Hathaway believes that this system avoids all fear of a dirth of skilled labor which so much concerns the manufacturers at the present time. L. D. Burlingame of the Brown & Sharpe Mfg. Company, Providence, R. I., outlined the plans of that company for increasing the skill of the men. Those in charge consider it better to mix apprentices with other men according to their experience, and the speaker urged that the modern apprenticeship scheme be pushed in all shops in this country. H. F. J. Porter, speaking from his own experience, had in connection with two plants, one in Pittsburgh and one in Philadelphia, was strongly in favor of industrial education, and declared that the need of it should be more widely appreciated. George R. Henderson asked some questions of the author, among them how to keep men after they are educated, explaining that he had encountered the discouragement of having men leave shortly after their employers had been put to the expense and trouble of educating them. Prof. Gaetano Lanza stated that he thought it dangerous to graft anything more on the public schools, such as industrial education, as had been suggested, but he believed that a trade school course should be open to those who would elect to take it.

"Ventilation of the Boston Subway,"

by A. J. Carson, Boston, Mass., was a paper of much interest to New Yorkers who desire to see the conditions in the New York Subway improved. The following is a brief synopsis of the paper:

The ventilating system for 4½ miles of the Boston Subway is based on the admission of fresh air at stations and portals and the withdrawal of so-called soiled air by exhaust fans at points about half way between. The air can be entirely renewed four times or more per hour. The soiled air from the old Subway (opened 1897) is discharged either through low shafts or through gratings in the sidewalks. In the subharbor portion of the East Boston tunnel the air currents, with a maximum velocity in the tunnel proper of 2½ ft. per second, if thought necessary, meet in the center of the tunnel, pass thence into ducts formed in the upper arch and leading in opposite directions, to fans respectively in Boston and East Boston. The soiled air in the Washington street tunnel cannot well be discharged into the open air at the points of extraction, but is carried by ducts, 270 to 430 ft. in length, to exhaust fans and is discharged generally at stations at points considerably above the street surface.

A table is given of carbon dioxide determinations in the subway stations when the fans are not running, and in schools, theaters and other crowded places. The results might be held by some to justify the omission of ventilating plants, but the writer concludes that means for complete positive ventilation in electric subways with dense passenger traffic should be provided and that the system is incomplete unless the cars are also ventilated.

C. S. Churchill, himself a writer on the subject, regarded Mr. Carson's paper as a very valuable one, since it furnishes a complete detailed record of a good mechanical ventilating system of an electrically operated subway, and one that can in principle be followed, not only by existing subways not ventilated as they should be, but also for subways to be hereafter constructed. He hoped that the author would add to his paper a report on the proportion of carbon dioxide in the air when the ventilating plant was in full operation, as it would give interesting data to compare with the figures given in this discussion as to the condition of air in the cars of various European subways that are mechanically ventilated. He was gratified that steps are now being taken for mechanically ventilating the New York Rapid Transit Subway. L. H. Woodbridge, anticipating inquiry concerning certain methods and means employed in the Boston Subway ventilation, gave a few additional statements. Explaining the determining factors in the selection of the apparatus, he included some tables compiled from a series of tests made at the Massachusetts Institute of Technology on the performance of a variety of fans, and commented on the advantages and disadvantages of each.

W. Clifford explained that the piston effect of moving trains must be considered in the ventilation of tunnels, and told something of the experiments in the Hoosac Tunnel, giving figures of the results. Francis Fox, Westminster, England, explained his manner of calculating what ventilation is required. Passengers defeat to a large measure such provisions as are made for ventilation by keeping doors and windows closed. Theodore Weinshank discussed the disk, cone and blower fans, principally as to when each of the types is best adapted. He mentioned that blowers are more expensive in many instances, but are warranted because they are positive.

"The Flow of Fluids in a Venturi Tube"

was the subject of the next paper, and was presented by E. P. Coleman, Buffalo, N. Y. The substance of the paper is given in the following abstract:

The properties of the Venturi tube have long been known, but have been rarely applied to the measurement of fluid flow except in more recent years for the metering of water. The object of these experiments was to prove (or disprove) to the writer and others the accuracy of the Venturi tube as a meter for gases and vapors at a comparatively low throat velocity. The Pitot tube was selected as an instrument for comparison on account of its proved accuracy and its ready availability. In the experiments the theoretical flow of air through the Venturi meter is apparently in agreement with the flow, as derived from Pitot tube observations, within the limits of reasonable errors of observation and within the range of velocities employed. In the experiments with dry saturated steam, the theoretical flow is in agreement with that obtained by weighing, but the scope of the experiments was not sufficient to prove accuracy in general. The separation of the theoretical expressions for throat velocity and weight of gas per second, each into factors, one of which is plotted to co-ordinates against the ratio of pressures, obviates much of tedious calculation where a meter of given dimensions is frequently used for measuring a gas having a given ratio of specific heats. Further and more complete data and coefficients for the Venturi tube in the measurement of gases and vapors are very much to be desired.

Professor Carpenter recognized as of most value in the paper the giving of the coefficient for the use of the Venturi tube in the measurement of gases and fluids generally and the proving of its accuracy for measurements of this kind. He referred to the St. John steam meter, which employes a Venturi tube of much the same character as that described by Mr. Coleman, and the Herschel Venturi meter for measuring water. S. A. Moss added to the author's remarks his own indorsement of the Venturi meter, having experimented and obtained the same results. With the coefficient of the nozzle discharge accurately obtained the Venturi meter would be an instrument of precision. Professor Williston explained that in tests made by him in St. Louis a few years ago he found that the Venturi meter checked within 1 per cent. of the measurements by orifices. The objection to the meter is that it is not good over a large range, or at least a single instrument is not good over a wide range.

FIFTH SESSION.

The first paper presented Thursday morning was the following,

"Tests of a Plunger Elevator Plant,"

by A. J. Herschmann, New York City, given here in abstract:

The tests of the plunger elevator, tables for which appear in this paper, are commercial tests made on the elevator plant of the Trinity Building, New York, while in regular operation. It was thought, by the plan adopted in making these tests, that

data would be obtained which would enable the plant to be readily compared with those of other buildings while in regular operation, and such data would more correctly define actual economy than the results obtained from a dead load test, in which intermittency of service would not be the same as in the ordinary running of an elevator plant.

Two series of tests are tabulated; in the first a duplex compound pump was used, and in the second a flywheel pump. With the use of the auxiliary steam line it was possible to run the elevator pump on a separate boiler of 350 hp., steam for the remainder of the plant, as well as for all boiler feeding, being supplied each day by a boiler of 265 hp. Roughly speaking, boilers and pumps were run at about half load, so that with heavier traffic the economy should be further improved.

A system by which the high rise elevators discharge into auxiliary tanks, from which water is supplied to a cylinder through an automatic valve when the pressure water is shut off on the up trip, saves about 5 per cent. of the plunger displacement in high pressure water. Approximate figures for evaporation are given. Water was measured by a meter which was calibrated before the tests and found to be substantially correct. The cost of coal per car mile was 5.22 cents with the flywheel pump and 8.04 cents with the duplex compound pump. Costs for service and necessary losses are figured.

F. H. Wheeler asked the names of the pumps, stating that the author had not been specific enough, and also thought that the paper would be more complete if indicator cards had been taken from the water cylinders. In the oral discussion R. P. Bolton made some criticisms of the form of the paper, and believed that it should have some revision before it goes into the Proceedings. He objected to the comparison of elevator tests by car miles, inasmuch as this does not allow for the load, and that such tests are not to be depended upon in the drawing of conclusions.

"Test of a Rotary Pump,"

by Prof. W. B. Gregory, New Orleans, La., the next paper of the morning, is briefly reviewed in the following:

The problem of pumping water economically is of prime importance in the coast country of Louisiana and Texas, where in the last 15 years the raising of rice by means of irrigation has developed into a leading industry. Compared with other pumping plants, on the basis of volume of water delivered, some of these are among the largest pumping plants in the world used for irrigation. Two types of pumps are commonly used, the rotary and the centrifugal; the plant tested, that of the Neches Canal Company, near Beaumont, Texas, is a good example of the former. There are four units, consisting of 18 & 36 x 48 in. tandem compound condensing Corliss engines directly connected to cycloidal rotary pumps; the displacement of each pump is 605 gal. per revolution. The water is lifted about 32 ft. The aggregate useful horsepower, with the entire plant in operation, was 1054. Steam is furnished by two water tube boilers. The test of August 8, 1906, was run with one boiler and two pumping units in operation. The fuel used was crude petroleum, and as the load was constant the entire test was exceptionally regular. The performance of the steam equipment was not exceptional. The most interesting result is that of the efficiency of engine and pump, that is, the ratio of useful water horsepower to the indicated horsepower; the efficiency for two units averaged 83.3 per cent.

The volume of water discharged by the pumps was measured in a steel flume by means of a current meter and a Pitot tube; the instruments were used alternately, and at the same time the revolutions of the engines were obtained by means of continuous counters. In the average it was found that the discharge as obtained by the instruments agreed almost exactly with the displacement of the pumps—in other words, that the slip was *nil*.

Prof. R. C. Carpenter thought that there was an error in the test, possibly due to the use of Pitot tubes. It is his experience that Pitot tubes are reliable only under proper conditions, and that they should be calibrated only under conditions identical with those under which they were used, in order to obtain accurate results and reliable data. A. M. Lockett gave it as his opinion that a rotary pump is not so good as a high speed centrifugal pump.

"Improved Transmission Dynamometer,"

by Professor W. F. Durand, Stanford University, California.

This paper calls attention to a modified form of Tatum belt dynamometer in which four sprocket wheels are used, all in one plane, with automobile or bicycle chain connector instead of leather belt, thus giving a nonslip drive through the apparatus. All bearings are run on balls or rollers and thus internal friction is reduced to a minimum. The rocking or balanced system is mounted on an emery steel plate support as substitute for a knife edge, and the movement of the arm is limited by stops to a narrow range, within which there is no appreciable constraint due to the flexure of the supports. With construction of this type the capacity of the dynamometer is relatively large for the size or space occupied, especially if high rotative speeds may be employed. In the instance cited revolutions of 1000 per minute, and a chain drive speed of about 2300 feet per minute were readily maintained. Calibration of the dynamometer by means of friction brake and comparison with constant derived by measurement and rational formulæ indicates a very small and uniform frictional resistance in the apparatus, a result naturally to be expected from the character of the construction.

The transmission dynamometer described by the author, Professor Carpenter believed was well worthy a practical trial by those who have use for such an instrument. He explained that while Professor Durand was at Sibley College, Cornell University, he designed a dynamometer which worked on similar principles, which he, Professor Carpenter, used with great satisfaction in testing the efficiency and friction of bicycles. It was the only one that could be found that was sufficiently sensitive and accurate for the work. It easily measured to within one-half of 1 per cent. of the total power transmitted. The author's later form he considered a distinct improvement over the older one for general purposes. The design of the dynamometer also appealed to Prof. J. J. Flather, who commended the use of the emery plate instead of a knife edge.

The next paper,

"Saw-Tooth Roof Construction,"

by F. S. Hinds, Boston, Mass., will be found in a more extended abstract in another part of this issue.

In discussing this paper G. R. Henderson called attention to a shop with a roof of the saw-tooth type, erected where wind pressure was high. The work was planned by him for the locomotive, erecting and machine shops for the Missouri, Kansas & Texas Railway. His discussion contained numerous illustrations, principally elevations, bringing out the original features in the construction, the objects of which were explained. L. H. Kunhardt indorsed the type of roof shown in the author's paper. In general, the disadvantages of most saw-tooth roofs, he explained, were the tendencies to leaks, poor ventilation, excessive heat and condensation on the glass. He gave suggestions as to how all of these disadvantages might be overcome. Ordinary ventilators will not take care of foul air. It is necessary to use either fans or direct radiation. His discussion also contained a table giving the disposition of saw-tooth roofs by States and approximate date of erection, and it was found that out of 2044 factories 168 now have saw-tooth roofs. S. H. Green considered that the paper lacked sufficient light on the troubles pertaining to saw-tooth skylights, and proceeded to point out what he regarded as faults in Mr. Hind's design, with methods of meeting these troubles. The advantages of the saw-tooth form of skylight lighting over ordinary skylights depend entirely upon the requirements of each case. If either north light is desirable or the direct rays of the sun objectionable, or both, then the saw-tooth roof is the only solution. But if these requirements do not exist then he thought the ordinary form preferable.

W. B. Snow called attention to Fig. 9 in the paper, which unfortunately is a bad picture, and gives the impression that the light is poor, which is not the actual situation. Prof. J. E. Sweet corrected some misstatements in the paper and referred to a roof of saw-tooth type on the Straight Line Engine Company's machine shop, stating how the troubles Mr. Hinds mentioned were obviated.

In closing, Mr. Hinds gave credit to Professor Sweet for applying the first saw-tooth roof on a machine shop.

The next two papers on similar subjects, "Saw-Tooth Roofs for Factories," by K. C. Richmond, Providence, R. I., and "Ferroinclave Roof Construction," by A. E. Brown, Cleveland, Ohio, were presented by title and discussed together. The following are abstracts of the papers:

Saw-Tooth Roof for Factories.

Saw-tooth skylight is a form of roof lighting designed to admit light from the sky without allowing the direct rays of the sun to enter. It is especially effective in rooms of large area where a great deal of diffused light is desirable. The angle of the window should depend upon the latitude and design of window trimming.

Windows do not necessarily face the north to give the best results. The framing may be of any of the usual building materials and should be of ample strength. Various types of construction are used, and any form of roof covering which successfully withstands attacks of heat, cold, wind, rain, snow and ice is available. Good material and skillful workmanship are very necessary in successful roof covering. The exposure to cold, which is greater on account of the usual arrangement of saw-tooth roofs to face the north, tends to increase the internal condensation. Extra care must be used in the sheathing to overcome this tendency. The portion of the roof below the sash should be well insulated. Frequently the sash is double glazed with an air space between the lights. Ribbed glass assists in diffusing the light. For textile mills, the glass should be without the green tint.

Heating presents no difficulties. Direct or indirect radiation may be used. Ventilation in hot weather is necessary, and is accomplished by fans, roof ventilators or windows which can be opened. Flashings must be carefully designed and put in. Inside conductors are altogether preferable to outside conductors in freezing climates. Thorough whitening of ceilings and interior surfaces is of great advantage.

Saw-tooth roofs are not discriminated against by insurance companies. The advantages of saw-tooth lighting lie in perfect diffusion of light, saving of artificial light and greater efficiency of help. Saw-tooth roofs cost from 40 per cent. to 60 per cent. more than flat roofs. The difference is largely offset when the cost of the whole building to give results comparable with saw-tooth lighting is considered. There has been a great increase recently in use of saw-tooth roofs. The proper proportioning of saw-tooth light is important without wasting money in their erection. To obtain the best results, there should be no intervals between the saw teeth.

Ferroinclave Roof Construction.

On account of the losses and detention in the business of the Brown Hoisting Machinery Company, due to the destruction of its shops by fire, it was decided to rebuild them as nearly fireproof as possible. It was found that fireproof roofing which weighed less than 30 to 45 lb. per square foot could not be obtained and Ferroinclave, which weighs about 15 lb. to the square foot, was invented. Ferroinclave is a sheet steel, with dovetailed corrugations, which are tapered to allow the shingling of the sheets. When laid the sheets are cemented on both sides with a mixture of 1 part of Portland cement to 2 parts of sand. The strength of Ferroinclave sheets with different thickness of cement on the upper side, and a uniform thickness on the under side, varies from 300 lb. to 3000 lb. per sq. ft., uniform breaking load, on a span of 4 ft. 10½ in. Ferroinclave sheets are erected in a manner similar to ordinary corrugated iron and then cemented on both sides. They are used in the construction of roofs, floors, side-walls, partitions, stairways, bins, &c. Generally the cost per square foot of a Ferroinclave roof completed varies from twenty to twenty-four cents, according to the location and the cost of suitable Portland cement that is used in it.

With reference to the first of these two papers, that by Mr. Richmond, S. M. Green alluded to his discussion of Mr. Hind's paper and emphasized two points. One of these was that the angle of the glass, as related to the direct rays of the sun, was not nearly so important as Mr. Richmond's paper would lead one to think. L. H. Kunhardt's discussion was also largely a reiteration of his discussion on Mr. Hind's paper. He regarded the saw-tooth type of roof to be also adapted to the heavy machine shops mentioned by the author, especially in shops having galleries on either side of a high center section over the cranes.

Report of the Committee on Refrigeration.

Prof. D. S. Jacobus, of Stevens Institute, Chairman of the Committee on Refrigeration, appointed in 1903, made a report which will go out with the first printed matter issued after the meeting. He called attention to the standard tonnage of refrigeration as embodied in the report adopted in 1904, and invited discussion on this preliminary report submitted at present, before it is regularly adopted.

A paper which excited special interest at this meeting was that on

"Our Present Weights and Measures and the Metric System,"

by Henry R. Towne, New York City, an abstract of which follows:

Although addressed to engineers, the paper is an appeal that all classes and interests shall unite in urging that the question of improving our system of weights and measures shall be referred to a Technical Commission, to be appointed by the President, whose report shall form a basis for permanent legislation. Since 1816 this subject has been before Congress, but without action, save the law of 1866, which legalizes the use of the metric system. No other great nation has acted on this question except on the basis of previous investigation by a technical commission; the need for this is greater in our case than any other, because of the highly developed state of our industries, most of which would be profoundly disturbed by any radical change.

France, Germany, and each of the smaller states which have adopted the metric system did so to obtain unity of weights and measures in place of a chaos of old units. We have absolute unity now, but would lose it by attempting to change to a new system, a change which as proved by the experience of France would not be completed in one hundred years. We now have also absolute unity with the British Empire save as to measures of volume.

Decimal notation is possible with any system, but although desirable for computation and scientific work, is unacceptable for the daily uses of the people, the latter invariably resorting to binary division. Our present "tables" can be simplified and improved without changing our units, the grain, the inch, and the gallon, which are as good as if not preferable to the metric units. Measures of length in many respects are immutable, are "linked irrevocably to the past."

The annual value of the manufactures of the United States and of Great Britain and her colonies (having a combined population of 150,000,000) is $11,000,000,000, and is equal to that of the combined manufactures of the eight largest manufacturing countries using the metric system. The adoption by us of their units of measurement would not affect their purchases from us, any more than their present use of the metric system affects our purchases from them. Of our total foreign trade in 1905, 49 per cent. was with Great Britain and the British Empire, or, if Russia and China are included, 54 per cent. The essential question is, What system is best for us, and this should be studied by a competent and fairly large Technical Commission, representative of all the great interests concerned.

John Quincy Adams is quoted as saying in his memorable report on this subject, "If there be one conclusion more clear than another, deducible from all the history of mankind, it is the danger of hasty and inconsiderate legislation upon weights and measures," a statement even truer to-day than in 1821. Therefore, before deciding what action, if any, is expedient, we should do as every other great nation has done, refer the whole question to a competent Technical Commission for exhaustive investigation and report. A bill to accomplish this has been introduced in Congress and forms an appendix to the paper.

An unusual number of discussions were offered on this paper. Those submitted in writing in advance of the meeting have already been printed in the society's Proceedings for December. These were recivd from H. H. Supplee, F. A. Halsey, Rear-Admiral George W. Melville, U. S. N.; James Christie and Prof. William Kent. Mr. Supplee's discussion has a peculiar value since it places on record for the society's transactions an account of the manner in which the metric system was adopted by France. It gave a complete translation of the law of July 4, 1837, which is still in force, but according to M. Domergue he has found impracticable to enforce. This translation is made from the text as given in the important work by M. G. Bigourdan of the Paris Observatory, entitled "Le Système Métrique des poids et Mesures. Son Etablissement et sa Propagation Graduelle, avec l'Histoire des Opérations qui ont Servi a Déterminer le Méter et le Kilogramme," which is the most complete and authoritative account in the French language of the origin and development of the metric system.

Mr. Halsey objected to the appointment of the commission, since to advociate it he regards as a tacit admission that a change is needed. He also opposed any minor reformation in our existing system of weights and measures. His discussions supplemented his views as already expressed in his paper on "The Metric System," read before the society at the New York meeting of 1902, and his book on "The Metric Fallacy," and contained extracts from letters which have been received since the publication of that book. Rear-Admiral Melville, although agreeing in the main with Mr. Towne, also dissented from his conclusion that it is desirable to appoint a commission to consider the matter of weights and measures. His familiarity with what has already been

done in attempting to force a bill through Congress compelling the use of the metric system, leads him to doubt if an unprejudiced commission could be appointed, as the testimony which has thus far been given by experts seems to be biased. He especially commended the author's paper for its complete and judicial presentation of the case with fairness to the views it opposes. James Christie advocated the appointment of a commission. Professor Kent thought the author's antimetric argument could not fail to convince a previously unprejudiced person that the adoption of the metric system in this country is undesirable if not impracticable or even impossible.

Among the oral discussions, one by J. S. Bancroft was entirely in approval of the author's sentiments with the exception that he is so strongly opposed to the metric system that he does not believe in the suggestion to appoint a commission to consider its adoption. He thought that the present English system should not be changed, and that no commission should be appointed to even consider it. F. Dale was another opposed to the metric system, and was unwilling to submit it to a commission because as an opponent of the metric system he believes his side in the right. S. Webber was of the opinion that coinage and some weights and measures might be modified, but he was opposed to a change to the metric system. Speaking for himself and for W. A. Viall of the Brown & Sharpe Mfg. Company, L. D. Burlingame of the same company, gave their reasons for opposing the metric system. He, however, believed that the society ought to be judiciary and not partisan, and should give due consideration to the question of the advisability of making a change. He admitted that there are some points that are open to criticism in our present systems which might be corrected by a committee particularly with a view to conform to Great Britain's standards.

George Schushmann had had experience in the use of both the metric and the English system, covering a number of years, and declared his preference for the metric system, believing that the confusion which it is averred will result if the metric system is adopted has been greatly exaggerated. J. C. Parker thought that the discussion went too much into details. He believed that if we desire to progress we should submit the question to a commission and let it decide. It was C. N. Trump's opinion that practical men would not learn the metric system. J. M. Smith explained that he had a three years' experience with the metric system and found it most convenient in spite of the fact that he had been brought up on the English system.

In his conclusion Mr. Towne stated that there were too many points to be considered fully in the time at his disposal, and that his closing remarks would be submitted in writing.

The business closed with the official installation of the new president, Prof. F. R. Hutton.

THURSDAY EXCURSION.

Thursday afternoon the members of the society were the guests of the New York Central & Hudson River Railroad Company, through the courtesy of W. J. Wilgus, vice-president, in the inspection of the new power station at Port Morris, N. Y., which will supply current for the electrified part of the system. The party was conveyed to and from the station by special train and under the charge of guides was conducted over the plant.

The complete plans for the electrification were made under the direction of W. J. Wilgus and Edwin B. Katte, chief engineer of electric traction. Ultimately the electrification will include the Hudson River division from the Grand Central station to Croton, and the Harlem division from the same station to North White Plains. This is known as the "Entire Electric Zone," and will include a total territory of 52 miles. The "Initial Electric Zone," which will be put into operation this month, extends as far as High Bridge on the Hudson River division and Wakefield on the Harlem division, a total of 17 miles.

The Port Morris power station at present contains four 5000-kw. turbo-generator units of the Curtis-General Electric type, and the Yonkers station will initially contain the same number, making the original capacity of the two stations 40,000 kw., or 56,000 hp. Eventually there will be 12 units, with a total capacity of 60,000 kw. The ultimate boiler capacity in the two stations will be 48 625-hp. Babcock & Wilcox water tube boilers, the initial equipment consisting of 32 boilers.

THURSDAY EVENING.

The customary reception of the members and guests by the president and president-elect, which constituted the only social event of the meeting, was held at Sherry's, at Fifth avenue and Forty-fourth street. Dancing followed the reception, and supper was served from 10 to 12 o'clock.

FRIDAY EXCURSION.

A most unusual opportunity was that given the society to inspect the Sandy Hook Proving Grounds and Fort Hancock on Friday at the invitation of the War Department through the Secretary of War, the Hon. William H. Taft, Brig.-Gen. Arthur Murray, Chief of Staff, and Brig.-Gen. William Crozier, Chief of Ordnance, acting in the part of hosts. The party numbered about 600, which is more than in all time before put together, excluding army officers, were allowed the privilege of visiting these fortifications. Practically the whole day was given to this trip, the special train on the Central Railroad of New Jersey leaving at a little after 9 in the morning and returning arrived at about 6 p.m.

A very remarkable programme was provided for the entertainment of the guests. The first event was an examination of the 16-in. gun, the largest and only one of its size which this country has ever built. It has been fired only five times and has fully met the requirements expected of it. It fires a projectile weighing 2400 lb., which, with a charge of 640 lb. of powder, attains a velocity of 24,345 ft. per second. After examining some armor plate targets which had been fired upon and others still to be used, the party proceeded to the ordnance front, where the following firings were witnessed: Two rounds from a 6-in. rapid fire gun mounted on a barbette carriage; five rounds from a 15-pounder rapid fire semi-automatic gun; the firing of a 10-in. rifle mounted on a disappearing carriage and having a Tabor indicator and Sebert velocimeter attached; of a 4.7-in. siege gun mounted on a long recoil carriage; three rounds of shrapnel from a 3-in. field gun, fired to explode over the water at a range of about 1000 yds., and 10 rounds from a 1-pounder pompom gun.

Visiting then the various fortifications the visitors were shown the maneuvering of a 12-in. gun on a disappearing carriage invented by Brig.-Gen. Crozier. To demonstrate the handling of one of these guns in actual firing 10 rounds of 1-pounder subcaliber ammunition were fired. Explaining the wonderful advances which have been made in the last five years in practice with these guns, Brig.-Gen. Murray stated that where formerly, using two guns alternately, a shot could be fired every 3 min. and 50 per cent. of the shots would be hits at a range of 4000 to 4500 yds., now the guns are shot with 100 per cent. accuracy at a range of 7000 yd., with an average interval between shots of only 43 sec. The various batteries were next inspected.

One of the most interesting revelations was the extent to which the handling of submarine mines has been reduced to an exact science. Where, only a short time ago, these mines depended upon uncertain mechanical means for exploding them, they are now controlled at will by electricity and may be operated or prevented from operating when and where the officer in charge desires.

The firings from the mortar batteries were hardly less interesting. The first event was the firing of a salvo from four 12-in. mortars simultaneously, followed by the exploding of a land mine on the beach and the firing of four rounds from a 7-in. howitzer, two with black powder and two with high explosive to explode in the air over the beach. Finally the visitors were allowed to inspect the gun-lift battery and the ballistic instruments in the ordnance office. Altogether this day's experience will be one long to be remembered by those who enjoyed it, for it was without doubt a privilege of a lifetime.

Registration.

The final registration of members and guests was 1352.

THE IRON AGE

1855—1906.

New York, Thursday, December 13, 1906.

DAVID WILLIAMS COMPANY, ... PUBLISHER
CHARLES KIRCHHOFF, ... } EDITORS
GEO. W. COPE, ... }
A. I. FINDLEY, ... }
RICHARD R. WILLIAMS, ... HARDWARE EDITOR

The Canadian Bonus and Iron Ore Development.

A feature of the iron and steel bounties provided for by the new Canadian tariff is the increase in the gap between the pig iron bounties—that is, between the bounty on the percentage made from Canadian ore and the bounty on the percentage made from imported ores. For the next three years the Canadian ore percentage in any furnace mixture will secure $1 a ton more bounty for the corresponding percentage of pig iron produced than will the foreign ore percentage, the amounts being respectively $2.10 and $1.10. Heretofore the difference has been 35 cents a ton. This was not sufficient, in the opinion of Finance Minister Fielding, to encourage the development of Canadian iron mines.

In the opinion of many who have given attention to the subject the trouble with iron ore development in Canada has been not so much lack of Government encouragement as lack of ore. The fact that more than half the pig iron produced in Canada in recent years has been made from imported ores is significant in itself. Prospecting has not been neglected. Two important steel companies with large investments in blast furnaces and mills have been one strong incentive, at least, to the development of native ore supplies. Another incentive has been furnished by the rapid appreciation in the value of iron ore in the United States, and the fact that important interests on this side are still seeking to fortify themselves by adding to their ore reserves. Prospecting on the Canadian shores of Lake Superior, in the hope of finding the continuation of the remarkable formation that has put Minnesota far in the lead among iron ore producing States, has been carried on by American rather than Canadian interests.

The fact that strong and long established steel companies in the United States have a far greater stake in getting control of any important ore finds that may be made in Canada than have Canadian steel manufacturers themselves, is likely to be a prominent factor in iron mining development across the border, and one that will count for more than any preferential bonus on pig iron into which Canadian ores enter. The Moose Mountain properties, north of Sudbury, Ont., acquired last year by well-known capitalists experienced in iron and steel manufacture in the United States, are already being put in shape to ship to this side in 1907, and it is quite well assured that these ores will practically all find their destination in this country. Significant also is the fact that American interests, rather than Canadian interests, have brought to light Bessemer ores of greater extent and value than was at first credited in the Thunder Bay district east of Port Arthur. It would be natural to expect that whatever is desirable in this or in other districts contiguous to Lake Superior would ultimately be acquired to reinforce the position of important steel companies on this side. On a smaller scale the situation is comparable with that which made the Steel Corporation the one interest with which Mr. Hill was willing to treat when he brought his big ore tonnage to market. Among the American steel companies, with tens of millions of investment and with ore supplies still insufficient for the farther future, measured by the standard set by the Steel Corporation's reserves, it is a question if there will not always be one whose willingness and ability to acquire a Canadian ore property of proved value will be sufficient to distance Canadian competition.

Canada's Method of Tariff Making.

Canada furnishes an interesting example of summary dealing with the vexatious tariff question. A tariff commission is appointed, hearings are given at various points throughout the country, public sentiment is thoroughly sounded, a tariff measure is prepared quickly and, with no hint as to what its details are to be, it is introduced in the Canadian Parliament and read, and at 12 o'clock on the night of its presentation it goes into effect in all the custom houses. Discussion in the legislative body follows this action, but with little probability that any amendments of consequence will be made, as the measure is introduced as the expression of the Government's conclusions on the matter, and the Government will doubtless be loyally supported by the majority party, elected with that purpose in view. It of course does not please everybody in the Dominion, for no tariff measure ever has been devised, or ever will be devised, by the Canadian Government or the Government of any other country which will attain that ideal state. But it has become for the time being the law of the land, and the special point about it is that it became so in a very few hours after it was made public.

This rapid method of procedure certainly has some advantages over the practice prevailing in our own country. Here we have a long drawn out process whenever the tariff undergoes a general revision. Once, in 1882, we also had a tariff commission charged with the duty of investigating the commercial and manufacturing conditions of the country and formulating a tariff bill. On all other occasions when the tariff is made a subject of revision the Ways and Means Committee of the House of Representatives gives public hearings and endeavors to arrive at a satisfactory method of framing a new schedule of duties to meet changed conditions. Even when we had a tariff commission the Ways and Means Committee was so insistent upon its prerogative in handling revenue measures that it refused to accept the ready made bill handed over to it and proceeded in the same way to perform its customary functions. After months of such hearings a bill is prepared which is reported to the House of Representatives, and that body endeavors to amend it and usually succeeds in making material changes. It then goes to the Senate, where the Finance Committee takes it in hand, holds public hearings and emulates the Ways and Means Committee in getting up a measure of its own, which fares well if it runs the gauntlet of the Senate without being torn to pieces and framed on somewhat different lines. Conference committees are then appointed to reconcile the differences between the Senate and the House, and an act different from the bill of either body may be the result. Even this does not become law until it has passed the scrutiny of the President and received his signature, so that if he should not approve it and a sufficient majority could not be mustered to support it over his veto the measure would be defeated and the time and labor expended on it would be in vain. Further, after the President attaches his signature a new tariff law seldom goes into effect quickly, as time is given so that everybody interested shall have ample notice of

the Government's intentions, as though they had not already had time to put their affairs in order.

A tariff measure thus never becomes effective in this country without a long season of travail and disturbance to business. Unless it is plainly foreseen that duties will be advanced merchants hesitate to lay in stocks of goods, but allow their warehouses and their shelves to become depleted, expecting to be able eventually to purchase at lower prices and desiring to avoid as much as possible a shrinkage in the value of what they have on hand. Manufacturers proceed cautiously in operating their factories, lest the value of their product may be cut down and serious losses entailed on contracts for raw materials and on merchandise in process of passing through their works. Improvements of all kinds are checked, for intending investors wait, in the expectation that prices of needed materials and the cost of labor may be lower. On the other hand, a confident expectation that prices will be enhanced brings about a different sort of disturbance of the business equilibrium. For instance, in 1890, when the passage of the McKinley bill was seen to be a certainty, carrying with it a sharp advance in the duty on tin plate, a special effort was made by merchants and large tin plate consumers to import as much tin plate as possible, in the expectation of realizing a handsome profit after the advanced duty should become effective. But importations were so great that the country became overstocked and tin plate was cheaper for months after the new tariff went into effect than it had been before Congress began to take steps toward tariff revision. Thus, under our cumbersome and dilatory methods of lawmaking business is upset for a long time, whether rates are to be lowered or advanced.

The Canadian method avoids this stretching of business interests on the rack for months. If anything is to be dislocated, the deed is done at once. Some one may be seriously hurt, it is true, but the whole country is not made to suffer. A strong objection to such a summary procedure is that business men would always be in danger of sudden tariff changes and hence, in making necessary contracts for materials or supplies running well into the future, might at times experience heavy losses from this cause, which would be avoided if ample notice was given, as in this country. The question may be raised whether the Canadian procedure will long be tolerated after the industries of that country have passed the stage of primary development at which they stand to-day. As they become more highly organized and more diversified, and their lines of operation become more fixed, the prospect of tariff revision is likely to be regarded with less complacence. With vastly much more at stake, the manufacturers of the United States are not at all likely to urge the grafting of the Canadian plan upon tariff procedure at Washington.

The Transportation Question

In these times of great prosperity manufacturers generally are endeavoring to increase their producing capacities. It is probable that before many weeks shall have passed plans will have been prepared for a large number of new buildings both in the way of additions and new plants to be erected as soon as the weather shall permit in the spring. Builders of machine tools are especially in need of large facilities, and their branch of trade is likely to expand to a considerable extent the coming year. Such an expansion as seems to be contemplated will necessitate the transportation of a large additional tonnage of both raw material and finished products, increasing the freight which has already congested the railroads to the extent that they acknowledge their inability to move it promptly with their present equipment. The result has been the closing down of some plants for want of raw material and the congestion of other plants with finished products. It is true that these conditions prevail only when the country is experiencing exceptional prosperity, but it is at just such a time that machine tool and other manufacturers need the best possible shipping facilities. The railroads claim that they are doing their best to move freight promptly, but in some instances there seems to be a question whether they exert themselves sufficiently to relieve the situation.

The plants that appear to suffer most for the want of proper freight transportation are those that are located on only one railroad. Only recently a large corporation has deferred the building of a new plant it had planned on property purchased for the purpose, because the land was situated on a single line, it having found by actual experience that it had no trouble with shipments to and from its plants located on competing lines, while it was found almost impossible to get proper transportation for freight from the plants located on a single railroad. Where a plant is located on two or more railroads there is keen competition for moving the freight, and each road will do its utmost to get the business, while when the manufacturer is at the mercy of one transportation company he is not likely to fare so well. This problem of freight transportation in busy times has caused more than one manufacturer to change the proposed location of a plant, and those who contemplate erecting new works will do well to give the matter serious consideration.

Our blast furnace statistics for November 1 showed that the active coke and anthracite pig iron capacity of the country had reached a half million tons a week for the first time in the country's history. The returns for December 1 show a further increase in active capacity and indicate that, counting charcoal iron, the country is now producing at the rate of over 27,250,000 tons a year. The possibilities of tremendous swings in pig iron output in comparatively short periods are strikingly shown by the last table in our blast furnace statistics of this week. The reversal of conditions, for example, from the drastic curtailment that was under way three years ago is remarkable. That movement brought down the active coke and anthracite capacity of the country to 185,636 tons a week on January 1, 1904, while 1907 promises to open with furnaces active capable of producing two and three-quarter times that amount in a week. Not for 13 months after the low point touched at the opening of 1904 did weekly production reach 400,000 tons, and it has remained above that figure ever since. The average for the past year has been well above 450,000 tons, but, as has been pointed out heretofore, only the blowing in of new furnaces in the past few months has made it possible to forge ahead after nearly a year's struggle against the hamperings of exceptional prosperity.

The plan to concentrate the metal and machinery interests in New York in one building, which was put forward last Thursday afternoon at a meeting of men interested in those trades, is deserving of serious consideration. Its advantages can be seen at a glance, and if the movement is successful there is little doubt that the scheme to form a club among the men in the trade will meet with instant approval. Before the work of building the Hudson Companies' terminal was begun the machinery trade was pretty well concentrated in the vicinity of Dey, Cortlandt and Liberty streets, and since a num-

ber of houses formerly located on the terminal site were forced to move to other parts of the city, buyers have found that it has taken them longer to do their business than formerly. Concentration of the trade in one locality has met with success in other cities, and it is admitted by all concerned that it is advantageous even for those in competitive lines to be close together. A club composed of men in the machinery and metal trades would no doubt be found an advantage in the furthering of mutual interests, and there seems to be a general desire to get together.

The Steel Corporation's New Construction for 1907.

The Finance Committee of the United States Steel Corporation has just authorized an extensive programme of new construction and improvements by the subsidiary companies for 1907. Mention is made below of the more important betterments contemplated. In addition, improvements involving a very considerable outlay in the aggregate have been authorized, but the latter are in the line of equipment, replacement and renewal.

Carnegie Steel Company.

Two new blast furnaces of 450 tons daily capacity will be erected at the Ohio Works, Youngstown, Ohio. At the same plant 12 open hearth furnaces of 50 or 60 tons capacity and a blooming mill and bar mills sufficient to finish the product of the open hearth plant will be built. A new ingot mold factory has also been authorized. This will supply molds not only to the Ohio Works, but probably to those at Sharon and in the Wheeling District. Youngstown is an important center for the manufacture of bars, hoops and cotton ties by the Carnegie Steel Company, and the new open hearth furnaces, which are the first plant of that description to be built at the Ohio Works, will furnish open hearth steel for bar and hoop products. It will also make possible the rolling of open hearth rails, billets and sheet bars at the Ohio plant. This will be, therefore, the only rail mill of the corporation, apart from that under construction at Gary, at which open hearth steel can be rolled direct from the hot metal.

New erection at the Clairton Works includes a 14 in. and a 22 in. structural mill, increasing very considerably the output of structural shapes at that plant. A 1000-kw. generator, with gas engine, will be added to the power plant.

At the Duquesne Works of the Carnegie Steel Company a new 16-in. merchant bar mill will be erected. Duquesne is already an important bar producing point for the Carnegie Steel Company. A new electric power station will be added at Duquesne, equipped with three 2000-kw. generators.

The chief improvement planned for the Bellaire Works is an extensive river pumping plant.

The above Carnegie construction is in addition to the two blast furnaces and 18 open hearth furnaces for Duquesne, which were decided upon in October in advance of the action upon the general schedule of improvements for 1907. When the 18 open hearth furnaces are completed the converting department at Duquesne, which has a capacity of 50,000 tons a month, will be dismantled. This will constitute the first actual replacement of Bessemer converters by open hearth furnaces at the works of the Steel Corporation.

Indiana Steel Company.

An appropriation has been made and work will begin in 1907 at Gary on the second group of four blast furnaces, 28 open hearth furnaces, and blooming, slabbing and finishing mills sufficient to work up the product of the above mentioned blast furnaces and steel works. The open hearth furnaces will be in two sets, 14 in a building, each set of melting furnaces being served by two blast furnaces.

Illinois Steel Company.

Two 250-ton mixers will be built for the Bessemer department of the Illinois Steel Company at South Chicago. The installation of a new 40,000,000-gal. pumping engine is also provided for.

National Tube Company.

At the Lorain, Ohio, Works, a 90-ft. blast furnace of 450 tons capacity will be built and six open hearth furnaces of 50 or 60 tons capacity. A new galvanizing plant will also be erected in connection with the tube works. The above mentioned will be the first open hearth furnaces to be built at Lorain.

The October action of the Finance Committee provided a new blast furnace at the McKeesport plant of this company, work on which has already begun.

The American Steel & Wire Company.

A factory for the manufacture of insulating wire and cables will be erected at the Waukegan Works, Waukegan, Ill. An extension to the docks at the Central Furnaces, Cleveland, Ohio, will be built, and a new power plant will be installed at these furnaces. A mill will be provided in the Cleveland District for rolling flats for cold rolling. New rod mills will replace a portion of the plant at Worcester, Mass.

The American Sheet & Tin Plate Company.

Four new hot mills will be erected at the Guernsey Works, Cambridge, Ohio, and the New Philadelphia, Ohio, plant will be reconstructed, one jobbing mill and one sheet mill being added. The programme for the Scottdale, Pa., Works includes a new galvanizing plant and the reconstruction of the mills.

Lorain Steel Company.

At the Johnstown, Pa., plant extensive improvements will be made which will practically double the output of frogs, switches, forgings and castings. A new open hearth furnace will probably be erected at the steel foundry.

American Bridge Company.

A new and extensive bridge works will be built at Elmira, N. Y., which with the company's plant now in operation at Elmira will make that an important center of fabrication for shipment to New England and New York State points. The important manufacturing centers of this company will then be Chicago, Ill.; Ambridge and Pencoyd, Pa., and Elmira, N. Y.

Some of the plant included in the above programme will be completed in 1907, while the more important construction will require 18 months and in some cases, as at Gary, a longer time. The new construction at the Ohio Works of the Carnegie Steel Company is expected to be completed by June 1, 1908. The expenditures for the mining and transportation subsidiaries of the corporation are apart from the appropriations referred to above.

At the annual meeting of the Baltimore Bridge Company, held in New York several days ago, Nathaniel Haven tendered his resignation as president. Minor C. Keith, who holds the predominating financial interest in the company, succeeded Mr. Haven in the presidency. H. D. Bush, who for several years has been in charge of the works at Baltimore, was made a director and elected vice-president and manager. James M. Motley was also added to the directorate, and was placed in charge of the New York office of the company, which has been removed to 66-68 Broad street. Mr. Haven, who has been in rather poor health for several months, will enjoy a period of rest before making any future plans.

The Philadelphia Foundrymen's Association.

The regular one hundred and sixty-second meeting of the Philadelphia Foundrymen's Association was held at the Manufacturers' Club, in that city, Wednesday evening, December 5. The president, Thomas Devlin, occupied the chair. There was a good attendance of both local and out of the city foundrymen. At this meeting the customary nominations for officers for the ensuing year were made. The entire list of officers, the Executive Committee and the trustees who have served the association during the past year were nominated for re-election without a dissenting voice, and will be formally balloted for at the annual meeting in January. R. T. Randall & Co., Philadelphia and New York, manufacturers of overhead tramways, &c., were elected to membership, and will be represented by Albert W. Moyer, manager of the tramrail department, Philadelphia.

Dr. Richard Moldenke, secretary of the American Foundrymen's Association, addressed the meeting on the subject of the annual convention of that association to be held in Philadelphia next year. The plans regarding the convention are progressing satisfactorily, and he announced that the Majestic Hotel, Broad street and Girard avenue, within a few blocks of the Second Regiment Armory, where the Supply Association will hold its exhibit, had been selected as the headquarters of the association. He also stated that plans for the formation of an allied association to the American Foundrymen's Association, composed of those interested in the brass foundry trades, were in preparation, and this association would no doubt be formally organized at the time of the annual convention. H. M. Lane, secretary of the Foundry Supply Association, announced that plans had been made regarding exhibits at the convention with the following space rates: 100 sq. ft. (10 x 10), $15; 200 sq. ft. (10 x 20), $25; 300 sq. ft., $33; 400 sq. ft., $40. For any space larger than 400 sq. ft., a uniform rate of 10 cents per square foot will be charged. Space has already been taken by a number of exhibitors.

The papers before the association for the evening included one by E. H. Mumford of the E. H. Mumford Company, Philadelphia, on "The Rathbone Multiple Molding Machine," which was illustrated in detail in *The Iron Age* of December 6, and another by H. C. Caldwell of the Caldwell Process Company, Philadelphia, on "A Sheet Steel Adjustable Flask Jacket," which was read by J. W. Daniels. A vote of thanks was tendered both Mr. Mumford and Mr. Caldwell.

The Cincinnati Metal Trades.

CINCINNATI, OHIO, December 10, 1906.—The regular quarterly dinner of the Cincinnati branch of the National Metal Trades Association was held at the Havlin Hotel December 6. A large number of Cincinnati business men, including the prominent machine tool interests, was in attendance, the meeting having been announced as very important on account of the topics under discussion.

The opening address was made by President March, who in his remarks stated that numerically the Chicago Metal Trades Association ranked first, with Cincinnati second. Phil. Fosdick, formerly connected with the Fosdick Machine Tool Company, acted most acceptably as toastmaster. The menu cards were elaborately designed and contained significant phrases well taken by the trade. The first formal speaker was S. C. Dickey, president of the Winona Technical Institute, Indianapolis, who illustrated his discourse with a number of stereopticon views, showing the progress of the institute from its incipiency to the present time. He was followed by John L. Ketcham, of the Brown-Ketcham Iron Works, Indianapolis, his subject being "Trade Schools and Artisans." Mr. Ketcham is a practical man and has devoted much time and thought to this subject. He said in part:

In talking this evening with Prof. J. L. Scheerer, of the Ohio Mechanics' Institute of Cincinnati, I learned that he had in his institute 1400 scholars. I was not surprised to learn, however, that there was no foundry department connected with it, as I have investigated the subject of foundry schools and have learned that there are practically none in the United States. A few months ago I had the pleasure of going over the Carnegie Trade School at Pittsburgh, with its director, Arthur Hammerschlag. It is a magnificent edifice, with granite walls and marble halls, a million dollar building, with prospects of additional buildings to cost as much more. When we came to the foundry, I said to my companion: "What a small room this is; you certainly do not propose to turn out journeymen molders?" He replied: "No, we do not propose to turn out journeymen of any kind; our school merely proposes to give a liberal education along technical lines." "Your foundry, then," I said, "is like the foundry of Cornell University, where the work is given with a view of teaching the scholars foundry methods, so that the bearing of methods upon engineering problems may be clear to them." There were only 12 apprentices in the foundry department of this large and magnificent technical school.

There are 6700 foundries in the United States and Canada. A great many of these admit apprentices and endeavor after a fashion to teach them, but there are no foundry trade schools so far as I have been able to find. I did, however, find one at the Indiana Reformatory at Jeffersonville. The superintendent of that school, W. H. Whittaker, started a foundry department a few years ago in his reformatory. He now has 300 boys in this department, and practically every one who leaves the institution is an experienced molder, able to go into any foundry and hold a position. Mr. Whittaker states that he has less trouble in securing positions for those employed in the foundry than any other class of inmates.

Far be it from me to cast any aspersions on a boy who has been confined in a reformatory. Such boys may and often do make good citizens. At the same time is it not a reflection upon us? Here we are, foundrymen, giving no attention to trade schools. We take a boy into our foundry, where he is inadequately taught, if taught at all. What he does learn is a matter of absorption or observation. Is it not time for us to give our attention to a practical trade school? At the Winona Technical Institute the National Founders' Association was invited to start a foundry trade school. We said to Dr. Dickey, the president: "Put up $5000 and we will put up $5000 more and erect a building, which was done. The National Founders' Association in annual convention voted $1000 for equipment and $3000 per annum for three years for scholarships. Our school has started. We have 10 scholars to-day, and I appeal to you to send us boys to educate in this foundry school at Indianapolis. It is not necessary to start a foundry school in Cincinnati. We have in our foundry school a director who came to us from the University of Minnesota, a most capable teacher. Send us your boys and we will send back to you first-class journeymen molders. We foundrymen have built up our business largely by the faithfulness and efficiency of our mechanics, and we should educate the sons of these faithful workers by placing them in trade schools that the burden of life may be lighter on them than on those that have preceded them."

Twist Drill Tests at Worcester.—A series of tests to ascertain the possibilities of twist drills made of high speed steels, conducted at the Worcester Polytechnic Institute, brought forward some interesting results, especially as to the angle of the lip of the drill. A special upright drill was constructed, rigid and with high power, and instruments were designed to measure the thrust and twisting moment of the drill under differing conditions of use. Nine different feeds were provided, ranging from 0.0045 to 0.0225 in. per revolution of the drill. A ⅝-in. drill was run at a constant surface speed of 70 ft. The drill was ground with a varying angle of the lip from 37½ to 70 degrees, the study being of the variation of the thrust with the angle of the lip. It was found that the 45-degree angle ought to give the best results in practical machine shop work, in preference to the accepted angle of 59 degrees. With the varying angles of the lip the thrust decreased from 70 degrees down to 45 degrees, and then increased for each further decrease in angle. The twisting moment proved to be in no way proportional to the angle of the lip, although nearly proportional to the feed. The thrust was proportional to the feed.

The $4.50 puddling rate has been announced to take effect on December 17 at mills in the Lebanon District of Pennsylvania. The American Iron & Steel Mfg. Company made it under the statement that an advance in wages amounting to that much per ton would be paid on and after that date. It employs a large number of puddlers.

Activity at Scotch Furnaces and Shipyards.

GLASGOW, December 1, 1906.—The features in our iron market at present are the American demand for pig iron and the enormous output of new ships. To take the latter first, the output of the Scotch shipyards in the 11 months ending November was 390 vessels of 603,920 tons. This is about 16,000 tons more than the entire output of the 12 months of 1905, and it was done in spite of a strike of shipyard workers, which kept the Clyde yards closed for eight weeks, as far as constructive work is concerned. Of the Scotch output in the 11 months no less than 282 vessels and 550,878 tons were from the Clyde yards. This is a record output, and is explained by the completion of orders booked in the autumn of last year.

With steel as dear as it is and likely to be dearer and with dear timber and copper it is impossible for shipbuilders to reduce their bids sufficiently to attract new orders from shipowners. With a 10 per cent. reduction in wages they might make a good cut, but wages are not to be reduced, and labor is the chief item in the cost of constructing new vessels. The fact that the output this year has exceeded and will further exceed all records does not affect the situation. There is little new work coming out, and a renewal of demand will not be seen probably before spring, if then.

Advancing Prices for Scotch Iron.

Scotch steel makers have been kept actively employed by export orders from the continent of Europe, Japan and from Canada and the Colonies. They are not so dependent on shipbuilding as they used to be. They met a few days ago to consider whether they should not advance prices, but decided to make no change. An advance might check the export demand and would certainly put a further obstacle in the way of renewal of shipbuilding orders. The advance in hematite pig iron is very much against steel makers. Hematite iron has now reached 75s. a ton, delivered to steel works, yet ship plates remain at £7 7s. 6d., boiler plates at £7 17s. 6d. and angles at £7 per ton, all less 5 per cent. Black sheets have advanced 5s. a ton, and in the North of England iron angles and bars have advanced to £7 10s. per ton. Iron ship rivets are now quoted £7 15s. per ton. In the Newcastle District sales of steel ship plates are reported for delivery over next year at £7 per ton, so somebody must have faith.

Pig Iron Exports to the United States.

The next feature of the trade is the strength in the pig iron position. This week a cable was received here from New York stating that the International Harvester Company had purchased 20,000 tons of foundry iron to be shipped from Middlesbrough to New Orleans. I cannot find that any Middlesbrough iron has been sold for shipment to New Orleans, but two steamers have been already chartered to take Scotch iron to New Orleans, the one to load 4000 tons and the other to load 3500 tons. The make of ordinary iron has been temporarily increased in Scotland, for when the demands began to come in from America the shipbuilding strike reduced the prospective demand for hematite, and makers then took a lot of their furnaces off hematite and put them on ordinary irons. They cannot change their furnaces again, at any rate not for some time, because they are so heavily sold in ordinary brands. The prospective scarcity of steel making iron is becoming a serious problem for our steel makers.

The bulk of the orders which continue to come in from the United States, and also from Germany, are for ordinary foundry iron. Cleveland warrants have advanced to 62s. 6d., while Cleveland warrant stock has been reduced below 530,000 tons. Cumberland hematite warrants have advanced to 76s. and the stock of hematite in the warrant stores is only 75,000 tons. Scotch furnacemen have advanced their prices all around. They are likely to advance them still further and to blow in more furnaces if they can, because home consumers are now pressing for supplies, both in Scotland and in England.

There are many inquiries in the market for steamers, both from the Tees and from the Clyde, for the United States, but charterers do not seem to be in such need as to press on at any freight. They can bide their time, for the trouble is to get the stuff from the makers. In fact the difficulties about deliveries seem rather to have checked the American demand of late. There are large inquiries from the United States this week, but they are coupled with the request to guarantee positively the date of delivery. There have been inquiries from your side of late for a large quantity of cast iron pipe for shipment to Boston, and the trade here will be glad if business results, for this branch has not been very active. Canada has been buying a good deal of Scotch iron, while Germany is buying as much Cleveland iron as if her furnaces were not turning out 1,000,000 tons a month, and she is now wanting hematite for next year. Home consumers are of course not pleased at this abnormal export demand, which promises to last through the winter. But prices nevertheless keep on the up grade, and in warrants there is now a good deal of speculation by outsiders. But who actually holds the stock in the Middlesbrough warrant stores remains a mystery. And whether that stock will melt away before the reaction sets in is the interesting problem of the trade.

The United Iron & Steel Company.—The incorporation has been effected of this company, which recently took over the Cherry Valley Iron Company of Pittsburgh, having a blast furnace at Leetonia, Ohio, and another at West Middlesex, Pa., coal properties in Fayette County, Pa., limestone interests and interests in ore properties. The company has a capital of $2,000,000 and bonds of $5,000,000. Edwin N. Ohl has been elected president; W. H. Schoen, vice-president and secretary, and A. W. Thompson, treasurer. The directors include the foregoing and J. W. Rhodes, W. B. Rhodes, Harry Rubens and L. E. Block, who is vice-president of the Inland Steel Company, Chicago. The United Iron & Steel Company will become operative January 10. It has also taken over the interest of the Cherry Valley Iron Company in the Pittsburgh Iron Ore Company, which has a capital of $10,000,000 and of which the Cherry Valley Iron Company owns considerably more than a half interest.

Announcement is being made to the members of the National Supply and Machinery Dealers' Association, the American Supply & Machinery Manufacturers' Association and the Southern Supply & Machinery Dealers' Association that the joint convention arranged for those organizations some time ago will be held at Cincinnati, Ohio, May 8, 9 and 10, 1907. The members of the three organizations are being asked to have as full a representation at the gathering as possible, and it is expected that each organization will have a larger gathering of its members than at any previous meeting. In connection with the announcement for the session made by the Southern Supply & Machinery Dealers' Association, it is stated that 21 new members have been added to the organization during the present term.

The Interstate Iron & Steel Company, First National Bank Building, Chicago, has purchased all the property of the Cambridge Rolling Mill Company, Cambridge, Ohio, and will operate the mill after January 1. The Cambridge mill was built and placed in operation in 1901, and is equipped with seven trains of 14-in. rolls and one Lauth heating furnace. Its product consists of Bessemer steel angles, flats, light rails and reinforced concrete sections. It has a capacity of 30,000 tons annually.

The creditors of the Continental Iron Company, Wheatland, Pa., which failed in 1898 for $500,000, will realize only 30 cents on the dollar. The referee in bankruptcy has passed on all the claims and directed the trustee to declare a final dividend. The trustee will have about $30,000 to disburse. The company was organized by Pittsburgh, Cleveland, Niles and Sharon parties, who bought the Wheatland rolling mill, and after operating it for some time gave it up.

October Iron and Steel Exports and Imports.

As compared with September, the October figures of the Bureau of Statistics of the Department of Commerce and Labor showed an increase in both exports and imports of iron and steel. The total value of exports of all kinds of iron and steel and manufactures thereof, not including ore, in October was $15,910,437, against $13,891,472 in September. The total value of similar imports in October was $3,407,763, against $2,832,199 in September. The commodities for which quantities are given also showed an increase in both exports and imports. The exports of such commodities in October reached a total of 104,626 gross tons, against 89,319 tons in September, 111,260 tons in August and 98,409 tons in July. Taking such commodities, the following table gives the exports for October and for the 10 months ending with October in 1906 and 1905:

Exports of Iron and Steel.

	October.		Ten months.	
	1906.	1905.	1906.	1905.
Commodities.	Gross tons.	Gross tons.	Gross tons.	Gross tons.
Pig iron	5,048	5,006	65,463	41,212
Scrap	657	431	9,931	6,560
Bar iron	4,966	1,973	46,950	26,591
Wire rods	....	391	5,677	4,836
Steel bars	2,718	1,168	25,144	18,070
Billets, ingots, blooms	10,170	27,804	180,632	179,880
Hoops	792	889	4,169	3,359
Steel rails	22,731	30,693	273,009	249,941
Iron sheets and plates	2,758	1,019	13,264	6,420
Steel sheets and plates	8,926	7,341	77,409	53,360
Tin plates and terne plates	435	428	11,057	6,929
Structural iron and steel	9,569	7,201	93,460	63,401
Wire	17,900	11,614	144,193	110,244
Cut nails	794	565	6,799	7,204
Wire nails	3,780	2,365	41,608	30,593
All other nails, including tacks	664	356	4,369	3,478
Pipes and fittings*	12,718	10,364	123,362	....
Totals	104,626	109,608	1,126,496	812,078

* Quantity not stated prior to July 1, 1905.

As compared with September, the gain in October was principally in steel rails, billets and wire. The increase in the exports of wire was notable, as the figures for September were 13,843 tons, while those for October were 17,900 tons.

The total imports of commodities for which quantities are given were 51,715 tons in October, against 39,679 tons in September, 34,112 tons in August and 52,715 tons in July. The imports of such commodities for October and for the 10 months ending with October in 1906 and 1905 were as follows:

Imports of Iron and Steel.

	October.		Ten months.	
	1906.	1905.	1906.	1905.
Commodities.	Gross tons.	Gross tons.	Gross tons.	Gross tons.
Pig iron	35,789	18,240	265,665	170,891
Scrap	692	3,924	11,203	12,604
Bar iron	3,146	2,992	28,754	29,186
Rails	321	2,272	3,697	16,560
Hoops	19	301	9,962	2,467
Billets, bars, &c., steel in forms n.e.s.	2,091	996	17,067	11,501
Sheets and plates	256	198	2,886	1,882
Tin plates and terne plates	6,090	3,796	43,846	58,778
Wire rods	1,636	1,726	15,080	14,458
Wire and articles made from	754	289	5,138	3,101
Structural iron and steel	921	1,982	26,625	9,903
Totals	51,715	36,716	429,923	331,331

The increased imports over September, as shown by the above table, were very largely in pig iron. The other gains over September were distributed throughout the different commodities.

The total value of exports, not including ore, in the 10 months ending with October was $142,609,320, against $115,596,224 in the corresponding period of the previous year. The total values of the imports, not including ore, for the same periods were, respectively, $27,784,650 and $21,820,949. The quantity of iron ore exported in the 10 months ending with October was 256,384 gross tons, against 179,919 tons in the corresponding period of the previous year, while the imports were, respectively, 908,366 and 709,766 tons.

The Carnegie Veterans' Annual Dinner.

The fifth annual reunion and dinner of the Carnegie Veteran Association, composed of 49 of Mr. Carnegie's old associates, occurred at the residence of Andrew Carnegie, New York, December 7. For five years Mr. Carnegie has made it a practice to invite them to dine with him. Twelve were prevented from being present and sent their regrets and messages of felicitation.

An important event of the evening was the presentation to Mr. Carnegie of three hero's medals—one of gold, one of silver and one of bronze—issued by the Carnegie Hero Fund Association, which is one of Mr. Carnegie's many benefactions. The presentation speech was made by C. L. Taylor of Pittsburgh, secretary of the Veterans and president of the Heroes' Fund, who said:

Mr. Carnegie is naturally a hero to us who have watched him during a long career of usefulness, now being rounded out by years of splendid benefactions to mankind. To us he will always remain a leader and the typical ideal of splendid manhood. He may have done nothing to entitle him to receive these medals under the technical limitations with which the Hero Fund administration has been hedged about. But in his splendid benefactions and in his great work for the uplifting of humanity he has saved more lives and done more for the good of mankind than any man who may become the recipient of one of these medals as a reward for the saving of human life.

At the table Mr. Carnegie had at his right William E. Corey, president of the United States Steel Corporation, and at his left James H. Reed, chairman of the present Executive Board of the Carnegie Steel Company. Others present were C. W. Baker, W. R. Balsinger, W. W. Blackburn, H. P. Bope, L. T. Brown, J. J. Campbell, A. C. Case, D. M. Clemson, W. B. Dickson, A. C. Dinkey, John C. Fleming, R. A. Franks, James Gayley, A. R. Hunt, J. G. Hunter, D. G. Kerr, F. H. Kindl, Thomas Lynch, E. S. Mills, A. Monell, Thomas Morrison, George E. McCague, W. C. McCausland, John McLeod, G. D. Packer, A. R. Peacock, L. C. Phipps, James Scott, Emil Swenson, C. L. Taylor, H. E. Tener, Jr., E. H. Utley, G. H. Wightman and E. F. Wood.

The absent members of the association were C. M. Schwab, J. E. Schwab, Wm. P. Palmer, J. Ogden Hoffman, P. T. Berg, George Lauder, Wm. L. Abbott, J. A. Potter, Wm. H. Singer, Homer J. Lindsey, Millard Hunsiker and J. G. A. Leishman.

Thirty Thousand Tons of Wrought Pipe for Burmah.

The largest single order for wrought pipe ever placed in this country for shipment abroad was closed on December 7. It calls for 30,000 tons of 10-in. steel pipe to be sent to Burmah, India, for the Burmah Oil Company, operating the extensive oil wells of Upper Burmah. The pipe line to be built extends from Upper Burmah to Rangoon, the principal refining and shipping point. The main line is 285 miles in length and the total length, including the branches, is 328 miles. The order was placed with the United States Steel Products Export Company, and will be filled by the National Tube Company, Pittsburgh. The first delivery will be in the middle of February, and thereafter shipments will be between 4000 and 5000 tons a month. Jacobs & Davies of New York, and Jacobs & Barringer of London, consulting engineers for the Burmah Oil Company, placed the contract. Charles M. Jacobs, chief engineer of the Hudson Companies, now building the Cortlandt street and Morton street tunnels under the Hudson River from Jersey City to New York, and also chief engineer of the Pennsylvania tunnels under the Hudson, is the senior member of both firms.

It is probable that all the machinery required by the pipe line will be bought in this country. The equipment will include complete generating units, if electrically operated pumps are employed, and pumps and engines if oil or gas operated engines are used.

A cablegram reports the discovery of a considerable bed of coal in North Antrim, Ireland. Borings in the same district near Ballycastle showed also a considerable deposit of black band iron ore, one estimate putting the probable amount of the latter at 150,000,000 tons.

Pig Iron Production Increasing.

Merchant Furnaces Exceed Their October Record.

The coke and anthracite furnaces of the country produced 2,187,665 tons of pig iron in November, a 30-day month, or within 9000 tons of the record output in the 31 days of October. While the steel companies as a rule did not equal their production in October, the Pittsburgh District in particular showing a falling off, the merchant furnaces made more iron in the shorter month of November than in October, their total being 776,315 tons, against 744,608 tons. The steel companies produced 1,411,350 tons in November and 1,452,200 tons in October. Thirteen furnaces were blown in in November and 12 were blown out, making 315 furnaces active on December 1, against 314 on November 1. The active weekly capacity shows a further increase, reaching high point on December 1 at 516,160 tons, against 500,580 tons on November 1.

In the following table is given the production of the coke and anthracite furnaces in November, as compared with the record for the preceding four months:

Monthly Pig Iron Production.

	July. (31 days)	August. (31 days)	September. (30 days)	October. (31 days)	November. (30 days)
New York	141,885	138,697	140,105	139,868	134,902
New Jersey	34,814	35,058	34,849	32,297	34,697
Lehigh Valley	51,761	51,979	50,946	51,224	49,636
Schuylkill Val.	52,751	47,940	48,245	50,375	57,649
Lower Susquehanna and Lebanon Val.	61,132	64,145	63,968	65,231	62,016
Pittsburgh Dis.	505,570	457,002	460,903	567,662	509,211
Shenango Val.	150,116	133,984	138,843	150,019	155,698
West. Penn.	103,733	94,874	98,237	116,588	116,732
Md., Va. and Kentucky	73,888	77,647	78,654	89,280	86,841
Wheeling Dis.	101,573	107,526	102,364	112,022	126,796
Mahoning Val.	161,073	136,415	149,635	186,983	187,261
Central and North. Ohio.	147,162	155,455	152,730	149,339	173,444
Hocking Valley and Hanging Rock	31,643	34,276	31,383	33,753	35,690
Ill., Mich., Minn., Wis., Mo. and Colo.	232,954	218,725	244,403	264,966	265,893
Alabama	127,165	130,771	132,554	143,254	150,506
Tennessee, No. Caro., Texas and Georgia.	36,182	42,242	43,143	43,947	40,093
Totals	2,013,402	1,926,736	1,970,962	2,196,808	2,187,665

To each of the above totals should be added about 35,000 tons, representing the monthly output of the charcoal furnaces, of which monthly statistics are not gathered.

Production of Steel Companies.—Returns from all the plants of the United States Steel Corporation, the Cambria, Pennsylvania, Maryland, Lackawanna, Wheeling, Republic, Jones & Laughlin, La Belle, Bethlehem, Calumet and Colorado companies show the following totals of products month by month. We present also separately monthly figures of the production of spiegeleisen and ferromanganese, which is included in the total:

Production of Steel Companies.—Gross Tons.

	Pig.—Total production. 1904.	1905.	1906.	Spiegeleisen and ferromanganese. 1905.	1906.
January	502,994	1,129,642	1,358,015	21,002	26,305
February	756,260	1,027,937	1,226,760	22,431	26,988
March	913,412	1,232,255	1,400,395	21,280	23,595
April	974,006	1,222,710	1,333,591	20,038	28,054
May	927,534	1,287,438	1,372,423	24,732	29,447
June	788,882	1,149,404	1,293,437	21,761	22,737
July	694,892	1,114,409	1,323,391	31,220	20,153
August	747,570	1,186,050	1,237,485	27,461	18,327
September	936,494	1,262,033	1,264,380	21,645	24,078
October	971,447	1,370,960	1,452,200	26,799	23,517
November	962,384	1,334,644	1,411,350	23,776	29,119
December	1,019,841	1,356,962	.....	29,481	.....

Among furnaces blown in in November were one Colorado at Pueblo, Missouri at South St. Louis, Franklin in New York, Hudson in New Jersey, one Bethlehem, one Shenango in the Shenango Valley, one Dunbar, Earlston and Rebecca in western Pennsylvania, one Central and Williamson in Alabama and Rome in Georgia, a charcoal stack which is now making coke iron. Among furnaces blown out in November were Palmerton No. 1 (spiegel) in the Lehigh Valley, one Duquesne, one Edgar Thomson and one Lucy in Allegheny County, Hall in the Shenango Valley, Steubenville in the Wheeling District, one Central in the Cleveland District, Star in the Hanging Rock District, one Sheffield in Alabama (banked), La Follette and Rockdale in Tennessee and Rising Fawn in Georgia.

The table below gives the active capacity per week of furnaces producing coke and anthracite iron on December 1 and November 1, 1906:

Coke and Anthracite Furnaces in Blast.

Location of furnaces.	Total number of stacks.	December 1.—Number in blast.	December 1.—Capacity per week.	November 1.—Number in blast.	November 1.—Capacity per week.
New York	13	13	26,281	13	26,593
Other New York	10	5	5,596	4	4,741
New Jersey	8	8	8,211	7	7,112
Spiegel	2	1	179	1	182
Pennsylvania:					
Lehigh Valley	23	17	12,006	16	10,682
Spiegel	3	2	731	3	882
Schuylkill Valley	13	12	13,451	12	11,746
Low. Susquehanna	8	5	6,384	5	7,381
Spiegel	1	1	674	1	266
Lebanon Valley	10	10	7,952	10	7,084
Pittsburgh Dis.	43	41	115,285	43	126,147
Spiegel	2	1	1,275	2	2,037
Shenango Valley	20	18	36,329	18	33,905
West. Penn	24	20	27,986	17	25,515
Maryland	4	3	6,743	3	7,169
Spiegel	1	1	1,241	1	1,133
Wheeling Dis.	14	13	28,623	14	26,761
Ohio:					
Mahoning Valley	17	17	43,694	17	42,239
Cent. and North. and Michigan	20	19	42,944	19	35,909
Hocking Valley and Hanging Rock	12	11	8,211	12	7,623
Illinois	21	20	47,056	20	46,199
Spiegel	3	2	1,901	2	1,813
Minnesota	1	1	1,193	1	1,243
Wisconsin	5	5	5,940	5	5,044
Missouri	1	1	762	0	0
Colorado	4	4	7,666	4	6,779
Spiegel	1	1	247	0	0
The South:					
Virginia	23	14	9,925	14	9,328
Kentucky	7	4	2,774	4	2,871
Alabama	46	31	35,634	30	32,277
Tennessee	18	12	8,195	14	8,883
Georgia and Texas	3	2	1,071	2	1,036
North Carolina	1	0	0	0	0
Totals	383	315	516,160	314	500,580

For a series of months the active coke and anthracite capacity fluctuated as follows, in gross tons:

	Capacity per week.		Capacity per week.
December 1	516,160	June 1	336,107
November 1	500,580	May 1	368,244
October 1	469,665	April 1	337,257
September 1	441,426	March 1	308,751
August 1	449,908	February 1	273,692
July 1	460,570	January 1, 1904	185,636
June 1	472,622	December 1, 1903	244,156
May 1	484,031	November 1	273,715
April 1	484,240	October 1	353,142
March 1	479,737	September 1	360,197
February 1	482,156	August 1	353,681
January 1, 1906	463,673	July 1	384,825
December 1, 1905	475,814	June 1	388,178
November 1	460,449	May 1	373,496
October 1	445,468	April 1	386,215
September 1	412,563	March 1	347,424
August 1	410,088	February 1	335,239
July 1	408,617	January 1, 1903	346,073
June 1	443,092	December 1, 1902	336,617
May 1	452,031	November 1	330,110
April 1	439,564	October 1	337,837
March 1	403,157	September 1	328,243
February 1	405,792	August 1	328,745
January 1, 1905	377,879	July 1	303,793
December 1, 1904	357,846	June 1	337,492
November 1	334,249	May 1	337,627
October 1	319,249	April 1	331,140
September 1	291,573	March 1	316,039
August 1	246,092	February 1	325,440
July 1	272,301	January 1, 1902	291,992

Prof. G. W. Bissell and 10 students from the College of Agriculture and Engineering, Ames, Iowa, visited Milwaukee December 6, on a tour of inspection of iron and steel manufacturing plants.

Customs Matters.

Merchandise Destroyed While in Custody.

In a decision written by Judge Somerville for the Board of United States General Appraisers and promulgated December 7 the principle is laid down that the customs tribunal has no jurisdiction in cases where imported merchandise has been destroyed while in the custody of the Treasury officers. The protest calling forth the board's ruling stood in the name of Semon Bache & Co., New York. It appears that while certain goods were lying in dock, before the regular customs examination, a fire broke out which destroyed them. The importer thereupon appealed to the board to reverse the action of the collector of the port in exacting full duties on the burned goods. In dismissing the protest Judge Somerville says that the importer's remedy does not lie with the Board of Appraisers, but under Section 2984 of the Revised Statutes, which makes the Secretary of the Treasury a special and final arbiter in the granting of allowances in cases of this kind.

Duty on Wire Reel Stock.

After the submission of much testimony in its favor the American Steel & Wire Company has been defeated in its contention for a lower duty on reel stock intended for use in holding wire. This case has attracted unusual attention owing to the amount of stock imported into the United States, as well as the prominence of the importer. The evidence submitted to the Board of Appraisers showed that the stock is prepared in such a manner that by the mere joining together of the various pieces the reel becomes a completed article. It has been contended by the customs authorities that the reels are so advanced in manufacture that they come within the provision in the tariff for "manufactures of wood," with duty at the rate of 35 per cent. It was maintained by the importing company that the reel stock was entered in a condition warranting its entry at the lower rates applicable to sawed lumber, or under other provisions of the tariff specifying reduced rates. According to the testimony placed before the Board of Appraisers, it is only necessary to assemble the parts of the reel to make the completed article. Under these circumstances General-Appraiser McClelland, who writes the decision for the board, finds that the stock is properly assessed by the authorities at the rate of 35 per cent. It is believed that the wire company will not accept the decision as final, but will take the issue into the Federal courts.

The Appraisers' Conference.

The annual conference of United States Appraisers, which began in New York December 3, reached adjournment December 10, after many subjects of interest dealing with the collection of the revenues and the conduct of the import business of the country had been discussed. It was stated that the appraisers found a growing uniformity at the different ports in the classification and appraisement of imported merchandise. While many new questions presented themselves at the convention, it was apparent that customs administration in this country has reached a degree of efficiency superior to that prevailing abroad and surpassing any previous period in the history of American tariffs. The formal report of the proceedings of the conference, together with the recommendations of the appraisers, will be forwarded to the Secretary of the Treasury. It was stated that the report will not be made public.

A meeting of stockholders of the Youngstown Sheet & Tube Company will be held in Youngstown, Ohio, January 10, to vote on the question of increasing the capital stock from $4,000,000 to $6,000,000, and also on the building of two or three blast furnaces. At present the company has an arrangement by which it gets Bessemer metal from five blast furnaces in the Valleys, but has recently been short of pig iron several times. Some splendid records for output are being made in its Bessemer plant, over 25,000 tons of ingots having been turned out last month.

NEWS OF THE WORKS.

Iron and Steel.

Missouri Furnace of the St. Louis Blast Furnace Company, St. Louis, Mo., was blown in November 16.

No. 4 furnace of the Shenango Furnace Company, Sharpsville, Pa., was blown in November 22.

Rebecca Furnace of the Kittanning Iron & Steel Company, Kittanning, Pa., was blown in November 13.

Dunbar Furnace No. 2 of the Dunbar Furnace Company, Dunbar, Pa., was blown in November 6.

After having been out 17 days for repairs, No. 1 Paxton Furnace of the Central Iron & Steel Company, Harrisburg, Pa., was blown in November 18. No. 2 Paxton Furnace has been blown out for relining.

Star Furnace of the Star Furnace Company, Jackson, Ohio, went out of blast November 13.

Rockdale Furnace of the Rockdale Iron Company, Rockdale, Tenn., was blown out November 24 for relining and will probably be in blast again by the middle of January.

The recent fire at Follansbee, Pa., was in the plant of the Sheet Metal Specialty Company, a considerable distance from the plant of the Follansbee Brothers Company, which was erroneously reported to have been burned. The latter company states that no fire whatever occurred in its plant, which is in full and continuous operation. Within a few days the company's steel works will be started, giving it increased facilities.

The Etna Steel & Iron Company, Etna, Ga., is opening up a large body of iron ore and will probably erect a blast furnace as soon as its ore properties have been sufficiently developed.

The Northwestern Iron & Steel Company, Seattle, Wash., recently organized by James A. Moore and others, and which is reconstructing the charcoal blast furnace at Port Townsend, will probably have it in operation in about six months.

The Rising Fawn, Ga., furnace of the Southern Steel Company went out of blast on November 15.

Williamson Furnace of the Williamson Iron Company, Birmingham, Ala., was blown in November 20, after having been out for some time.

The William B. Pollock Company, Youngstown, Ohio, manufacturer of heavy plate construction, has increased its capital from $100,000 to $600,000.

A dispatch from San Francisco, Cal., states that the Great Western Rolling Mills Company has been incorporated with a capital stock of $500,000 and that it will erect an iron and steel plant which is expected to be ready for operation next summer.

The Nicetown Plate Washer Company, Philadelphia, Pa., which has been running one mill on light flat iron bars, will shortly increase its capacity, putting in another furnace, which will give it a capacity of 40 tons a day, when round and square iron bars will also be rolled.

Reports in the daily press that the Pittsburgh Steel Company would build two blast furnaces and an open hearth steel plant at Monessen, Pa., where its rod and wire mills are located, are premature if not untrue. It is probable that some time in the future, perhaps before long, the company may make such additions to its plant, but when this will be done has not been decided by officials of the company, who refuse to discuss the reported project.

Palmerton Furnace No. 1 of the New Jersey Zinc Company, at Palmerton, Pa., was blown out November 17.

Franklin Furnace of the Franklin Iron & Mfg. Company, Clifton, N. Y., blew in November 23.

General Machinery.

Forge shop equipments are being installed by the B. F. Sturtevant Company, Boston, Mass., for the National Rolling Mills, McKeesport, Pa.; Knickerbocker Ice Company, Chicago, Ill.; blower system of heating and ventilation, roundhouse of the Canadian Pacific Railroad, Broadview, Saskatchewan, P. Q.; car shop, Somerset Railway Company, Oakland, Maine; National Cash Register Company, Dayton, Ohio; St. Joseph Lead Company, Bonne Terre, Mo.; mechanical draft apparatus, Chicago Water Works, Chicago, Ill.; People's Gas & Electric Company, Burlington, Iowa; Watertown Electric Company, Watertown, N. Y.; American Electrical Works, Phillipsdale, R. I.; American Locomotive Company, Dunkirk, N. Y. Recent sales include high pressure blowers of rotary type, Berry Engineering Company, Chester, Pa.; Crane Company, Chicago, Ill.; Kansas City Portland Cement Company, Kansas City, Mo.; Heany Fireproof Wire Company, York, Pa.; generator sets, G. H. Breymann & Bros., Boston, Mass.; Washington Navy Yard; Silver Bros. Iron Works, Salt Lake City, Utah; Hoopes & Townsend, Hoopeston, Pa.; Old Dominion Steamship Company, Norfolk, Va., and C. H. Mears & Co., Chicago, Ill.

The Smith & Post Company, Milwaukee, Wis., recently incorporated with a capital stock of $100,000 to manufacture metal sawing machines, crusher equipment, &c., is erecting new shops at Fond du Lac avenue and Locust street, 80 x 100 ft.,

of steel construction, which will be equipped with a 10-ton crane, 10-ft. boring mill, cylinder boring machine, grinders, lathes, planers, milling machines, gear cutters, &c. T. L. Smith is president; C. F. Smith, vice-president; E. B. Symons, secretary, and P. W. Post, treasurer.

The plant of the Peirce Specialty Company, Chicago, is being moved to Elkhart, Ind., where a large vacant factory building has been secured which provides ample room for present additions to producing capacity. This company makes a specialty of heavy electrical construction machinery and is adding a galvanizing plant to complete the necessary departments for its various lines. Excellent transportation facilities are provided and a side track which connects with the main lines permits direct shipments to be made in car lots and obviates handling on incoming material. Cheap electric power is also provided by a central station having a capacity of 18,000 hp., with a reserve of twice that amount. The company advises us that it will retain a Chicago office and wareroom.

The Stanley Automobile Mfg. Company, Mooreland, Ind., capitalized at $20,000, is purchasing machinery to equip its plant, where a general utility machine will be manufactured. W. R. Lines is president; Eli Holiday, vice-president; J. H. Corey, secretary; J. E. Rogers, treasurer, and James Stanley, general superintendent.

An addition, 28 x 354 ft., is being built to the Pond works of the Niles-Bement-Pond Company, at Plainfield, N. J.

The Pennsylvania Engineering Works, New Castle, Pa., is building an addition to its machine shop, 65 x 90 ft. A storage runway, 60 x 325 ft., over which a roof will be placed, is also being erected. This company is preparing plans for a new two and one-half story office building, 45 x 65 ft., to be built of brick and fireproof construction. It has recently put in operation a gap riveter 12 ft. 6 in., capable of producing 150 tons pressure, which is served by a 25-ton electric traveling crane which is 60 ft. above the floor line. This crane has a crane travel of 40 ft. and a trolley travel of 50 ft. This equipment permits the company to handle its large work with ease. Among contracts recently received is one for the erection of a new blast furnace of 500 tons capacity for the New York State Steel Company, Buffalo, N. Y.

The Bay State Machine Company, Erie, Pa., manufacturer of rubber mill machinery, is enlarging its business by adding a number of new lines, such as rubber tubing machines, rubber sanding machines, tire molds, tiling molds, die presses, &c., and will probably add more machinery to the plant in the near future to enable it to take care of the increased output.

The Landis Tool Company, Waynesboro, Pa., has elected the following directors: W. T. Omwake, A. H. Strickler, Fred. Forthman, Henry Rinehart, P. D. Hoover, W. H. Snyder, J. F. Shank, S. M. Kitzmiller and Frank Barnett. A dividend of 7 per cent. was declared just before the election.

The Hermance Machine Company, Williamsport, Pa., has experienced such a large demand for its woodworking machinery that it found it necessary to make additions to its plant to increase its output. The company has built an addition to its machine shop, giving it 75 per cent. additional capacity, and is now doubling the size of its foundry.

The Buffalo Pitts Company, manufacturer of traction engines, steam rollers and agricultural machinery, Buffalo, N. Y., is erecting an addition to its plant.

Power Plant Equipment.

The Quincy Engine Company is enlarging its plant at Quincy Pa. A brick foundry is being erected and a large addition will be made to the machine shop. A new cupola will be built.

The Harrisburg Foundry & Machine Works, Harrisburg, Pa., has secured orders for the building of six engines to be used for power plants along the Santa Fe system. The company is also building several large engines for the plant of the Fairbanks Morse Company at Chicago. It reports a large run of business for 1907 delivery.

The Weber Gas Engine Company, Kansas City, Mo., is contemplating the erection of extensive additions to its plant at Sheffield, to provide additional manufacturing facilities to meet the growing demand for its multiple cylinder vertical gas engines and suction gas producers. Among the sales recently made for plants operated on a number of different kinds of fuel, such as Virginia and Pennsylvania anthracite, charcoal, coke, &c., are the following: Hannah Pickett Mills, Rockingham, N. C., 300 hp.; Blacksburg Packing & Supply Company, Blacksburg, Va., 125 hp.; Blalock Island Irrigation Company, Walla Walla, Wash., 125 hp.; Bassett & Co., Valparaiso, Ind., two plants, 75 hp. each; Home Stove Works, Chicago, Ill., two plants, 100 hp. each; City of Rocky Ford, Colo., for water works plant, two 100-hp. plants; Choteau Milling Company, Choteau, Mont., 60 hp.; Grimes & Sons Flour Mills, Salisbury, N. C., 60 hp., and Keweenaw Printing Company, Calumet, Mich., 60 hp.

The firm of D. C. Stover & Co. has been organized at Freeport, Ill., with a capital of $50,000 to engage in the manufacture of marine engines. The company is already erecting a plant and expects to have engines to offer the trade early in the spring.

The Rust Boiler Company, Pittsburgh, is taking bids on the construction of a brick and steel power house to be erected at Midland, Pa., from plans drawn by M. P. M. Boilgaard, engineer, German National Bank Building, Pittsburgh.

Foundries.

Levering Bros., Baltimore, Md., have opened a branch gray iron foundry at Hanover, Pa., consisting of a main building, 50 x 100 ft., with a pattern shop 25 x 50 ft. The new foundry is under the management of G. M. Beard, late of the Beard Foundry, Glenville, Pa.

The Lebanon Steel Casting Company has been incorporated with a capital stock of $15,000 to operate a plant at Lebanon, Pa. W. E. Farrell is treasurer.

The E. G. Rippel Steel Foundry Company has been incorporated at Buffalo, N. Y., with a capital stock of $50,000, to manufacture steel castings by the crucible process. The company has leased premises on Indiana street, which it will equip. E. G. Rippel, formerly vice-president of the Buffalo Foundry Company and president of the Buffalo Crucible Castings Company, with both of which companies he has recently severed his connection, will be president and treasurer of the new company. W. C. Miller, foreman of the Buffalo Crucible Casting Company and formerly foundry superintendent of the Latrobe Steel Company at Melrose Park, Ill., will be foundry superintendent.

The Central Steel Casting Company, Columbus, Ohio, is being organized by J. L. V. Bonney and Walter Floyd, formerly connected with the Jeffrey Mfg. Company of that city. The company will have a capital of $100,000 and it is the intention to erect a plant having a capacity of 500 tons of steel castings monthly. Equipment purchases are now being made.

The Millansin Engineering & Foundry Company has been organized at Sharon, Pa., and will manufacture brass castings, drop forgings, ordnance and tools. Work on the new plant has been started.

The Morton Iron Works, Brooklyn, N. Y., has incorporated with a capital stock of $20,000.

The Chambersburg Engineering Company, Chambersburg, Pa., whose plant is located on a 20-acre site, has recently added a large iron foundry equipped with three 20-ton air furnaces, cupolas, electric traveling cranes, &c., for handling castings up to 200,000 lbs. A modern steel foundry is now in course of erection at the plant, to be equipped with three 40-ton open hearth furnaces, to supply the heavy steel castings used by the company. The demand for the company's products has constantly increased and has necessitated additions to its facilities in every department.

Bridges and Buildings.

The State of Pennsylvania will shortly ask for bids for the erection of a large bridge at Mifflinville on the Susquehanna River. The plans for this bridge were prepared by Herman Laub.

Fires.

The explosion of a boiler on December 6 at the factory of the P. J. Harney Shoe Mfg. Company, West Lynn, Mass., started a fire which destroyed that plant, the plant of the Tufts & Friedman Shoe Company and several other buildings. The total loss is placed at over $300,000.

The plant of the Michigan Lubricator Company, Detroit, Mich., was damaged $10,000 by fire December 6.

The foundry of the American Locomotive Works at Providence, R. I., was burned December 9, the loss being about $50,000.

The plant of the International Portland Cement Company at Elizabeth, near Pittsburgh, Pa., was damaged $100,000 by fire on December 9.

The main building of the paper mills of Bradford Lewis, at Walpole, Mass., was burned December 7, the loss being about $30,000.

Hardware.

The Burlington Blanket Company, Burlington, Wis., has just erected a power house at a cost of about $20,000. It is run entirely by electricity, the company having installed its own generators direct connected units.

The Cleveland Gas & Electric Fixture Company, Cleveland, Ohio, is about completing the erection of a new factory in Conneaut, Ohio, which will have about 75,000 sq. ft. of floor space and a full equipment of improved machinery. The new plant and its furnishings are to be mainly devoted to the company's new line of box fixtures which, it is said, will comprehend all requirements in low and medium priced fixtures, each packed separately in a cardboard box, so that they can be carried on the shelves, with all parts intact and clean and fresh when ready for installation.

The Hercules Float Works, Springfield, Mass., has recently made extensive additions to its plant. These include a new brass foundry, which it expects to have in operation some time this month, and also a large addition to its coppersmith department, already in operation. The company reports that it is several months behind orders and has been running its factory 24 hours a day in an effort to keep up with the demands made upon it.

The Graham Nut Company, with general offices in Pittsburgh and works at Neville Island, Pa., has made arrangements to enlarge its plant, which, when completed, will practically double the output. Two new buildings will be constructed, one 60 x 200 ft. and the other 95 x 100 ft., in which will be installed entirely new equipment, consisting of several hot pressed nut machines, cold punched nut machines and several classes of bolt heading machines of the latest type. Trade conditions have made this move necessary, and the company expects to have the addition in operation by April 1 next. The buildings will be of brick and steel construction. J. M. Stetter, general superintendent of the Indiana works of the Republic Iron & Steel Company, has resigned his position, to take effect at an early date, and has associated himself with the Graham Nut Company. He will be general superintendent of the Neville Island plant and have charge of the new construction. The present officers of the company are: Albert Graham, president; Harry C. Graham, treasurer, and Chas. J. Graham, secretary. With the additional equipment arranged for the company will cover the general bolt and nut line thoroughly.

The Vehicle Apron & Hood Company, Columbus, Ohio, has increased its factory space until now the plant is about three times as large as it was in 1903. The company has 30,000 sq. ft. of floor space devoted exclusively to the manufacture of waterproof accessories for vehicle and automobile trade. Fifteen men on the road cover every part of the country.

The B. & R. Rubber Company, North Brookfield, Mass., has been organized by Thomas G. Richards and Charles C. Beebe, recently with the Boston Woven Hose & Rubber Company, Cambridge, Mass. The company has taken the factory buildings formerly occupied as the E. & A. H. Batchelder shoe factory, containing 155,000 sq. ft. of floor space. The plant is of heavy mill construction, with foundations suitable for the installation of the necessarily heavy machinery. The company will manufacture rubber heels, soles, horseshoe pads, mats and matting, tubing and similar lines. Mr. Richards, the president, had the entire factory management of the Boston Woven Hose & Rubber Company, and Mr. Beebe, the treasurer, was that company's sales manager for a part of its line. Preparations for manufacturing are well under way.

The Emmert Mfg. Company, Waynesboro, Pa., has elected the following directors: A. E. Price, D. W. Hess, Jason Bell, Simon Wiener, H. G. Gordon, J. G. Corbett and J. Stover Price. The company has had a very successful year.

The Uco Brass Mfg. Company has been incorporated in Philadelphia, Pa., with a capital stock of $50,000 to manufacture all kinds of brass. Louis J. Somer, Jr., is the head of the company.

The Spring Steel & Wire Fence Company, Anderson, Ind., has completed arrangements to erect a branch plant at Coffeyville, Kan., the Commercial Club of that city and representatives of the company having reached an agreement in regard to the matter. The capital stock of the Coffeyville branch will be $75,000, of which $50,000 will be paid in. The stockholders with the Anderson parties will be bankers and business men of Coffeyville and influential farmers in the vicinity. The plant will comprise five buildings, which will be constructed of brick and cement and thoroughly modern in every respect. The company will manufacture woven and barb wire, nails and staples and may take up a special line of wire manufacture. The looms will be built by the company at Anderson and the remainder of the equipment necessary will be secured in the West. The shipping facilities from Coffeyville are excellent, four trunk lines going through the city. The company also intends to enlarge the main plant at Anderson.

Miscellaneous.

The Pittsburgh Reduction Company, Pittsburgh, manufacturer of aluminum, is building a small addition to its works at East St. Louis.

The General Fireproofing Company, Youngstown, Ohio, manufacturer of expanded metal for reinforcement of concrete, Herringbone expanded steel lath and diamond mesh lath, is making some large additions to its plant, among which are a reinforced concrete building, 60 x 180 ft., to be completed about January 1, which will be used for the manufacture of Allsteel sectional units and filing devices for offices. In this building pin truss girder frames are used for beams and girders, expanded metal is used for floor slabs and cold twisted lug bars are used for columns. The company has under contract a brick and steel building, 85 x 198 ft., for the manufacture of pin truss girder frames, and plans are being prepared for an addition to the power plant and a large crane over the steel bar yard. Only recently a brick building of 15,000 sq. ft. floor space was completed for the manufacture of expanded metal lath and other products. Another building for twisting cold twisted lug bars and another to be used as a japanning department were recently completed. The building for twisting cold twisted lug bars is a temporary one only and will be replaced in the spring with a large and substantial building. Work on the 60 x 180 ft. two-story addition to the furniture department and also on the 85 x 198 ft. building is well advanced. The new office building, consisting of two wings, one 36 x 36 ft. and the other 36 x 73 feet, of cement construction, is also being erected. Plans are under way for a bar storage yard which will be served by a 10-ton electric crane with 95 ft. span and 350 ft. travel.

The Broadwell Company has been incorporated at Rochester, N. Y., to manufacture automobile appliances, with a capital stock of $10,000. The incorporators are W. C. Broadwell, O. E. Broadwell, G. J. Bauer and J. Bauer.

The Rowley Lead Company, St. Louis, Mo., will erect a building, 100 x 200 ft., at Detroit, Mich., of steel and concrete construction for the manufacture and corroding of white lead from the metal under a new system which, it claims, will produce lead of a very high quality in a very short space of time. The building will be equipped with special machinery, pumps, motors, transmission machinery, &c.

J. H. Wagenhorst & Co., Youngstown, Ohio, have recently received orders for Wagenhorst automatic electric blue printers from American Steam Pump Company, Battle Creek, Mich.; Eugene Dietzgen Company, Chicago, Ill.; New England Structural Company, Boston, Mass.; Alvey-Ferguson Company, Louisville, Ky.; Hoppes Mfg. Company, Springfield, Ohio; G. D. Peters & Co., London, England; Oklahoma City Railway Company, Oklahoma; Vulcan Iron Works, Wilkes-Barre, Pa., and Electric Vehicle Company, Hartford, Conn.

A charter has been granted to the American Welding Company, which will have an office and plant at Carbondale, Pa., to manufacture and do work under patents it recently secured. It has a capital of $100,000. Frank A. Dempsey of Brooklyn is at the head of the company.

The Ohio Galvanizing & Mfg. Company, Niles, Ohio, manufacturer of sheet metal specialties, has recently enlarged its buildings and has added new machinery and equipment which about doubles its capacity for the manufacture of ice cans, brick pallets, heavy street cleaning cans, coal shutes and other specialties in sheet metal.

The Niagara Falls Brass Works, Niagara Falls, N. Y., has been merged with the Hoefler Smelting & Refining Company, Buffalo, and the plant will be moved to Buffalo and consolidated with the plant there, which will be considerably enlarged. The name of the merged company will be the Niagara Falls Brass Works.

The Philip Carey Mfg. Company, Cincinnati, Ohio, manufacturer of roofing materials, steam pipe and boiler coverings, &c., has purchased 17 acres of land in the industrial annex district at Hamilton, Ont., and will build a Canadian branch factory on the site.

In explaining the small quarterly dividend declared on the common stock of the American Car & Foundry Company, President Eaton states that all of the company's plants are running to their fullest capacity, requiring the carrying of an enormous amount of material, and that there is necessity for increased working capital to start its new steel car plant at Madison, Ill., and for the new steel car plant at St. Louis, Mo.

The Locomotive Improvement Company has been organized at Clinton, Iowa, with a capital stock of $12,000, to manufacture a new locomotive driving box, patents for which are pending. Chas. Markel, L. W. Barker, Oscar Jensen, J. H. Dunham and A. P. Barker are the directors.

The Union Switch & Signal Company, Swissvale, Pa., has just been awarded the entire contract for the interlocking and signaling of the great terminal station now being constructed in Washington, D. C., by the Pennsylvania and the Baltimore & Ohio railroads. The installation will be electro-pneumatic, similar in its general characteristics to that in the railway yards of the Pennsylvania Railroad at the Union Station in this city. The Washington installation, however, will be the largest and most complicated signaling and interlocking installation that has ever been constructed in the world. The largest one previous to this was put in service at St. Louis at the beginning of the World's Fair, and before that the most important was the electro-pneumatic interlocking system at the terminals of the Boston South Station. Both of these plants were also installed by the Union Switch & Signal Company.

The Gravity Coupler Company has moved its headquarters from Virden to East Peoria, Ill., and has awarded a contract for the manufacture of its gravity mine car couplings to the R. Herschel Mfg. Company. The latter company will erect an addition to its plant for manufacturing and assembling these mine car couplings, but it is denied that a drop forging department will be added for the present, at least.

The St. Louis Car Company, St. Louis, Mo., has increased its capital from $2,500,000 to $3,000,000. The new shares were all taken by President George J. Kobusch. The Kobusch Automobile Company, which holds the American rights to the French Mors machine, has also been merged with the company. The St. Louis Car Company is now completing a Kobusch-Wagenhals motor car for the Missouri Pacific & Iron Mountain System, which is intended for use on branch lines. It is also building 61 all steel cars for the New York Central Railroad.

Manufacturers in Pittsburgh and adjacent district who use natural gas for fuel have been advised by the Philadelphia Company, People's Natural Gas Company and Manufacturers' Light & Heat Company of an advance in the price of 10 to 12 per cent. As yet there has been no advance in the price to domestic consumers.

The Iron and Metal Trades

Pig Iron production in November, a short month, was within 9000 tons of the record breaking total for October. Returns to *The Iron Age* show that Coke and Anthracite furnaces produced 2,187,665 tons in November and 2,196,808 tons in October, or at a daily rate of 72,982 tons last month, as compared with 70,865 tons in October. Active capacity on December 1 was 516,160 tons a week, which, counting Charcoal furnaces at about 8000 tons a week, represents 27,250,000 tons a year. Steel works furnaces fell short of their October performance, while merchant furnaces produced about 32,000 tons more in November than in October.

It may be inferred from the above figures that relief to the present strained conditions is on the way. It is to be remembered that our blast furnaces have not yet been subjected to the test of real winter weather, also that the South is on the eve of the holiday absenteeism that always plays havoc with its production.

The feature of the Pig Iron market in the past week has been the cropping out of demand for Iron for the second half of 1907, and in some districts a good beginning has been made in contracting for such deliveries. New England buyers have taken about 20,000 tons and an important New York State interest has bought for its Malleable and Steel foundries. Some sellers are asking $1 a ton less for the third quarter than for the first half, while others make little or no difference. Southern sellers have rather dominated Eastern Foundry Iron markets and sales for the third quarter have been made at $19, Birmingham. Further sales of Basic Iron for the third quarter have been made at $22.50 to $23, delivered at eastern Pennsylvania mill.

The import movement, including Iron afloat or for which shipping arrangements have been made, is variously put at 150,000 to 200,000 tons. Importers are unwilling to commit themselves beyond the winter months and little Iron is now offered by foreign sellers that can reach this side before late February. The advances abroad have brought imports practically to a parity with domestic Irons; hence no large additional movement is now expected.

Throughout the Finished Material market the changes are still rung on unparalleled conditions, from which week after week there is no sign of relaxing. Consumption, gauged by Pig Iron, appears to be increasing.

Among Rail orders the most important is 33,000 tons for the Georgia & Florida. Chicago reports $1 a ton advance in Light Rails and $3 in Angle Bars.

The Burmah Oil Company's contract for 10-in. pipe for the line from Burmah to Rangoon has been placed entire in the United States, and amounts to 30,000 tons.

In Structural Material the chief new business is 8000 tons for the approaches to the Blackwell's Island Bridge. Mills are again filling up rapidly after a breathing spell.

Railroad buying of Bar Iron has been a feature in Western markets, and prices on shipments from the Central West to Chicago territory have advanced. Everywhere the demand for Bars continues heavy.

Higher prices have been paid for the heavier Sheets and there is a prospect of a general advance.

In Wire products the orders booked thus far in December have exceeded all records for an equal period.

The United States Steel Corporation's programme of new construction in 1907, just announced, represents an addition of about 1,000,000 tons a year in Pig Iron and 1,500,000 tons in Steel, apart from what is provided by the second block of the new capacity at Gary, Ind. An important fact is that the new open hearth furnaces to be built at Duquesne will replace 600,000 tons of Bessemer Steel capacity at that plant.

A Comparison of Prices.

Advances Over the Previous Month in Heavy Type. Declines in Italics.

At date, one week, one month and one year previous.

	Dec.12, 1906.	Dec.5, 1906.	Nov.14, 1906.	Dec.13, 1905.
PIG IRON, Per Gross Ton:				
Foundry No. 2, Standard, Philadelphia	**$24.50**	$24.50	$23.50	$18.25
Foundry No. 2, Southern, Cincinnati	25.00	25.00	25.00	16.75
Foundry No. 2, Local, Chicago	**25.50**	25.50	24.50	19.25
Bessemer, Pittsburgh	**23.85**	23.35	22.85	18.35
Gray Forge, Pittsburgh	22.85	22.85	22.85	17.10
Lake Superior Charcoal, Chicago	**26.00**	26.00	23.50	20.00
BILLETS, &c., Per Gross Ton:				
Bessemer Billets, Pittsburgh	**29.50**	29.50	28.50	26.00
Forging Billets, Pittsburgh	**36.50**	36.50	36.00	30.00
Open Hearth Billets, Phila	33.00	33.00	33.00	30.00
Wire Rods, Pittsburgh	**37.00**	37.00	35.00	32.50
Steel Rails, Heavy, Eastern Mill	28.00	28.00	28.00	28.00
OLD MATERIAL, Per Gross Ton:				
O. Steel Rails, Chicago	20.50	20.50	20.50	16.50
O. Steel Rails, Philadelphia	**20.00**	20.00	19.50	18.25
O. Iron Rails, Chicago	28.00	28.00	28.00	23.00
O. Iron Rails, Philadelphia	**27.75**	27.50	26.00	24.50
O. Car Wheels, Chicago	**25.00**	24.50	23.00	19.00
O. Car Wheels, Philadelphia	**23.00**	23.00	21.50	17.50
Heavy Steel Scrap, Pittsburgh	**20.00**	20.00	17.50	17.50
Heavy Steel Scrap, Chicago	17.50	17.50	17.50	15.25
FINISHED IRON AND STEEL, Per Pound:	Cents.	Cents.	Cents.	Cents.
Refined Iron Bars, Philadelphia	1.83½	1.83½	1.83½	1.83½
Common Iron Bars, Chicago	1.71½	1.71½	1.71½	1.85
Common Iron Bars, Pittsburgh	1.80	1.80	1.80	1.90
Steel Bars, Tidewater, New York	**1.74½**	1.74½	1.64½	1.64½
Steel Bars, Pittsburgh	**1.60**	1.60	1.50	1.50
Tank Plates, Tidewater, New York	**1.84½**	1.84½	1.74½	1.74½
Tank Plates, Pittsburgh	**1.70**	1.70	1.60	1.60
Beams, Tidewater, New York	1.84½	1.84½	1.84½	1.84½
Beams, Pittsburgh	1.70	1.70	1.70	1.70
Angles, Tidewater, New York	1.84½	1.84½	1.84½	1.84½
Angles, Pittsburgh	1.70	1.70	1.70	1.70
Skelp, Grooved Steel, Pittsburgh	**1.65**	1.65	1.57½	1.55
Skelp, Sheared Steel, Pittsburgh	**1.70**	1.70	1.60	1.65
SHEETS, NAILS AND WIRE, Per Pound:	Cents.	Cents.	Cents.	Cents.
Sheets, No. 27, Pittsburgh	2.50	2.50	2.50	2.20
Wire Nails, Pittsburgh	**2.00**	2.00	1.90	1.80
Cut Nails, Pittsburgh	**2.05**	2.05	1.95	1.70
Barb Wire, Galv., Pittsburgh	**2.45**	2.45	2.35	2.25
METALS, Per Pound:	Cents.	Cents.	Cents.	Cents.
Lake Copper, New York	**23.00**	22.75	22.50	19.00
Spelter, St. Louis	**6.50**	6.35	6.35	6.40
Lead, New York	**6.12½**	6.05	6.00	6.00
Lead, St. Louis	**5.92½**	5.87½	5.90	5.75
Tin, New York	**42.85**	42.45	42.65	36.00
Antimony, Hallett, New York	25.00	25.00	25.00	13.00
Nickel, New York	45.00	45.00	45.00	40.00
Tin Plate, Domestic, Bessemer, 100 lb., New York	$4.09	$4.09	$4.09	$3.59

Chicago.

FISHER BUILDING, December 12, 1906.—(*By Telegraph.*)

An active inquiry for Pig Iron to cover future requirements has developed and operators are endeavoring to establish prices for the last half of next year on a basis that will be equitable to themselves and consumers as well, with existing conditions as the basis. Sales of odd lots of No. 2 Southern Iron have been made at $17, Birmingham, for the last half, but there is an inclination among furnaces to ask an advance of 50c. above this price, which will undoubtedly be established in a few days. For the second quarter $19 is quoted, while for the first three months there is a reduction of 50c. a ton each month from $22.50 for January shipment. Northern operators have not reached a basis as yet, but it is probable that $21.50 will be established for the last six months for No. 2. The strength of the Iron market is reflected in finished products, which are being advanced from week to week. Light Rails have again been marked up $1 a ton, while Splice Bars have been advanced $3. The increased cost of Wire products has not affected the consumption to any appreciable extent and new orders placed during the first 10 days of this month with the leading interest show an increase over the same periods in October and November. This record is without precedent in the Wire trade, and is considered the more phenomenal on account of the season. All of the mills are now uniformly asking 1.70c., Pittsburgh, ordinary requisitions, for Plates, although 1.60c. can still be done on desirable tonnages. Specifications for Structural Shapes continue to improve, although the accumulated tonnage on the mill order books of the Illinois Steel Company shows a decline in the past 30 days amounting to 25,000 tons.

Pig Iron.—Following heavy purchases of foreign Iron by the International Harvester Company, other large consumers in this district have been making inquiry, but it is doubtful if any of the negotiations now under way will reach a successful consummation, on account of the deferred deliveries and the high prices prevailing for January and February shipment. Quotations on both the domestic and foreign product at Chicago are practically on a level for this period, while for more extended deliveries prices favor domestic producers. In addition only a few consumers are in position to take advantage of the drawback, which was the deciding factor in the Harvester Company's purchase. Car lots of Southern Iron for prompt shipment have been sold at $26.90, Chicago, while for January delivery $25.90 has been done. Malleable Bessemer and Northern Foundry grades for spot delivery have sold at $26, but little is available at this price. Quotations for first quarter delivery, f.o.b. Chicago, including the 25-cent advance in freight rates on Southern grades, are as follows:

Lake Superior Charcoal	$26.00 to $26.50
Northern Coke Foundry, No. 1	26.00 to 26.50
Northern Coke Foundry, No. 2	25.50 to 26.00
Northern Coke Foundry, No. 3	25.50 to 26.00
Northern Scotch, No. 1	26.00 to 27.00
Ohio Strong Softeners, No. 1	26.00 to 26.50
Ohio Strong Softeners, No. 2	25.50 to 26.00
Southern Coke, No. 1	25.65 to 26.15
Southern Coke, No. 2	25.15 to 25.65
Southern Coke, No. 3	24.65 to 25.15
Southern Coke, No. 4	24.15 to 24.65
Southern Coke, No. 1 Soft	25.65 to 26.15
Southern Coke, No. 2 Soft	25.15 to 25.65
Southern Gray Forge	23.15 to 23.65
Southern Mottled	22.65 to 23.15
Malleable Bessemer	26.00 to 26.50
Standard Bessemer	25.30 to 25.80
Jackson Co. and Kentucky Silvery, 6 %	27.30 to 27.80
Jackson Co. and Kentucky Silvery, 8 %	29.30 to 29.80
Jackson Co. and Kentucky Silvery, 10 %	31.30 to 31.80

Metals.—The Copper market is more active and prices have advanced as a result of the heavy buying to cover future requirements. Sheet Zinc has also advanced 10 cents, while Spelter continues its upward movement. We quote: Casting Copper, 24⅛c. to 24⅝c.; Lake, 24¼c. to 24¾c., in car lots for prompt shipment; small lots, ¼c. to ⅜c. higher; Pig Tin, car lots, 45½c.; small lots, 45¾c.; Lead, Desilverized, 6.05c. to 6.15c., for 50-ton lots; Corroding, 6.75c. to 6.85c., for 50-ton lots; on car lots, 2¼c. per 100 lb. higher; Spelter, 6.75c.; Cookson's Antimony, 28½c., and other grades, 26½c. to 27½c.; Sheet Zinc is $8.10 list, f.o.b. La Salle, in car lots of 600-lb. casks. On Old Metals we quote: Copper Wire, 19¼c.; Heavy Copper, 19¼c.; Copper Bottoms, 18¼c.; Copper Clips, 18¾c.; Red Brass, 18¼c.; Red Brass Borings, 14¾c.; Yellow Brass, 14½c.; Yellow Brass Borings, 12¾c.; Light Brass, 11¼c.; Lead Pipe, 5.40c.; Tea Lead, 5c.; Zinc, 5c.; Pewter, No. 1, 28c.; Tin Foil, 34c.; Block Tin Pipe, 27½c.

(*By Mail.*)

Billets.—Occasional car lots of Forging Billets are being sold on the basis of $38, f.o.b. Chicago, while several inquiries for round tonnages have been turned down by the mills being unable to make the shipments desired. A small tonnage of Rolling Billets was offered in this market recently by a Southern interest at $33.50, but found no buyers. An advance of $2 a ton on Wire and Chain Rods has been announced by the American Steel & Wire Company, establishing a basis of $37, Pittsburgh, or $40, Chicago. Even at this price tonnage for prompt shipment is being refused, orders for future requirements alone being booked.

Rails and Track Supplies.—An advance of $1 a ton has been made on Light Rails by the Illinois Steel Company, and Angle Bars have been marked up $3. The increase in the cost of the latter will, however, affect only a comparatively small tonnage, as contracts for the bulk of next year's requirements accompanied all 1907 Rail orders placed by the railroads. The demand for Spikes is almost unlimited, and the market has a decided upward tendency. We revise quotations as follows: Angle Bars, accompanying Rail orders, 1907 delivery, 1.65c.; car lots, 1.90c.; Spikes, 2.25c. to 2.50c., according to delivery; Track Bolts, 2.65c. to 2.75c., base, Square Nuts, and 2.80c. to 2.90c., base, Hexagon Nuts. The store prices on Track Supplies range from 0.15c. to 0.20c. above mill prices. Light Rails, 30 to 45 lb. sections, $33; 25-lb., $34; 20-lb., $33; 16-lb., $36; 12-lb., $37, f.o.b. mill. Standard Sections, $28, f.o.b. mill, full freight to destination.

Structural Material.—Specifications for Shapes thus far this month show a big increase in volume as compared with the average for November, although the mills are still in position to make prompt deliveries. New projects are limited almost entirely to the power house for the Chicago & Milwaukee Electric Railroad, for which 2500 tons will be required, and minor improvements. Warehouse stocks are moving freely on the basis of 2.05c. to 2.10c. Mill quotations are unchanged, as follows: Beams and Channels, 3 to 15 in., inclusive, 1.86½c.; Angles, 3 to 6 in., ¼-in. and heavier, 1.86½c.; larger than 6 in. on one or both legs, 1.96½c.; Beams, larger than 15 in., 1.96½c.; Zees, 3 in. and over, 1.86½c.; Tees, 3 in. and over, 1.91½c., in addition to the usual extras for cutting to extra lengths, punching, coping, bending and other shop work.

Plates.—On current business the Western mills are now quoting on the basis of 1.70c., Pittsburgh, this price having been established by the Carnegie and Ilinois Steel companies without formal action. Desirable orders for future requirements can still be placed at 1.60c., with these interests, but, as most of the forward business has already been booked, the market is fairly well established at 1.70c. Specifications are heavy, and shipments are delayed from 30 to 60 days. We quote: Tank Plates, ¼-in. and heavier, wider than 6¼ and up to 100 in. wide, inclusive, car lots, Chicago, 1.76½c. to 1.86½c.; 3-16 in., 1.86½c. to 1.96½c.; Nos. 7 and 8 gauge, 1.91½c. to 2.01½c.; No. 9, 2.01½c. to 2.11½c.; Flange quality, in widths up to 100 in., 1.86½c. to 1.96½c., base, for ¼-in. and heavier, with the same advance for lighter weights; Sketch Plates, Tank quality, 1.86½c. to 1.96½c.; Flange quality, 1.96½c. Store prices on Plates are as follows: Tank Plate, ¼-in. and heavier, up to 72 in. wide, 2c. to 2.10c.; from 72 to 96 in. wide, 2.10c. to 2.20c.; 3-16 in., up to 60 in. wide, 2.10c. to 2.20c.; 72 in. wide, 2.35c. to 2.45c.; No. 8 up to 60 in.wide, 2.15c. to 2.25c.; Flange and Head quality, 0.25c. extra.

Bars.—The Illinois Central Railroad divided its order for 7000 tons of Iron Bars among three or four of the Western mills at prices ranging from 1.71½c. to 1.76½c. The Republic Iron & Steel Company has made an advance of $1 a ton on Iron Bars for Western shipment, and is quoting on a basis of 1.65c., Pittsburgh, equivalent to 1.81½c., Chicago. Quotations are revised as follows: Iron Bars, 1.71½c. to 1.81½c.; Steel Bars, 1.76½c., both half extras; Hoops, 2.16½c., extras as per Hoop card; Bands, 1.76½c., as per Bar card, half extras; Soft Steel Angles and Shapes, 1.66½c., half extras. Store prices are as follows: Bar Iron, 2.10c. to 2.25c.; Steel Bars, 2c. to 2.10c.; Steel Bands, 2c., as per Bar card, half extras; Soft Steel Hoops, 2.35c. to 2.45c., full extras.

Sheets.—Sales of the heavier gauges have been made in this market at an advance of $1 a ton above prevailing quotations, and indications generally point to an early official advance in prices. Shipments are deferred from 60 to 90 days, and stocks for immediate requirements are limited almost entirely to the large distributers. We quote: Blue Annealed, No. 10, 1.96½c.; No. 12, 2.01½c.; No. 14, 2.06½c.; No. 16, 2.16½c.; Box Annealed, Nos. 17 to 21, 2.51½c.; Nos. 22 to 24, 8.56½c.; Nos. 25 and 26, 2.61½c.; No. 27, 2.66½c.; No. 28, 2.76½c.; No. 29, 2.86½c.; No. 30, 2.96½c.; Galvanized Sheets, Nos. 10 to 14, 2.71½c.; Nos. 15 and 16, 2.91½c.; Nos. 17 to 21, 3.06½c.; Nos. 22 to 24, 3.21½c.; Nos. 25 to 26, 3.41½c.; No. 27, 3.61½c.; No. 28, 3.81½c.; No. 30, 4.31½c. Sheets from store, Blue Annealed, No. 12, 2.25c.; No. 14, 2.30c.; No. 16, 2.40c.; Box Annealed, Nos. 18 to 21, 2.70c.; Nos. 22 to 24, 2.75c.; No. 26, 2.80c.; No. 27, 2.85c.; No 28, 2.95c.; No. 30, 3.35c.; Galvanized from store, Nos. 10 to 20, 3.20c. to 3.25c.; Nos. 22 to 24, 3.45c. to 3.50c.; No. 26, 3.55c. to 3.60c.; No. 27, 3.65c. to 3.85c.; No. 28, 4.00c.; No. 30, 4.55c. to 4.60c.

Merchant Steel.—Western implement manufacturers are pressing the mills for the shipment of all kinds of Merchant Shapes, specifications continuing unprecedentedly heavy. New tonnage is limited to small lots for immediate needs, as the large consumers are covered by contracts placed during the summer months. We quote: Planished or Smooth Finished Tire Steel, 1.96½c.; Iron Finish, up to 1½ x ½ in., 1.91½c.; Iron Finish, 1½ x ½ in. and larger, 1.76½c., base; Channels for solid rubber Tires, ¾ to 1 in., 2.26½c., and 1⅛-in. and larger, 2.16½c.; Smooth Finished Machinery Steel, 2.01½c.; Flat Sleigh Shoe, 1.71½c.; Concave and Convex Sleigh Shoe, 2.06½c.; Cutter Shoe, 2.35c.; Toe Calk Steel, 2.31½c.; Railway Spring, 1.96½c.; Crucible Tool Steel, 6½c. to 8c., and still higher prices are asked on special grades. Shafting, 50 per cent. off in car lots and 45 per cent. in less than car lots, in base territory.

Merchant Pipe.—Considering conditions in the trade, the advance of $2 announced last week is generally looked upon as very conservative. Practically all of the mills are congested with work and shipments are deferred from 30 to 60 days. Discounts on car lots, Chicago, are revised as follows: Black Steel Pipe, 76.35 on the base sizes, ¾ to 6 in., and Galvanized, 66.35. From store in small lots Chicago jobbers quote 73½ to 74 per cent. on Black Steel Pipe, ¾ to 6 in. Iron Pipe is held at an advance of 4 to 5 points above these prices.

Boiler Tubes.—Notwithstanding recent advances on Merchant Pipe, Boiler Tubes remain unchanged. Specifications are coming forward in large volume, but new tonnage is light. Mill quotations are as follows on base sizes, 2¾ to 5 in., in carload lots: Steel Tubes, 68.35; Iron, 55.35; Seamless, 50.35; 2½-in. and smaller and lengths over 18 ft., and 2½ in. and lengths over 22 ft., 10 per cent. extra. Store prices are unchanged, as follows:

	Steel.	Iron.	Seamless.
1 to 1½ in	40	35	42½
1¾ to 2¼ in	50	35	35
2½ in	52½	35	30
2¾ to 5 in	60	47½	42½
6 in. and larger	50	35	..

Cast Iron Pipe.—Purchases to cover future requirements are being deferred by large consumers in this district, including the railroads, municipalities, gas and water companies, owing to the high prices that are prevailing. Current business is seasonably light. We quote: Water Pipe, 4 in., $37 to $38; 6, 8, 10 and 12 in., $36 to $37; over 12 in., $35 to $36, with $1 extra for Gas Pipe.

Coke.—The lack of transportation facilities is delaying shipments from the Connellsville and Virginia fields, and spot By-product Coke is scarce, as the producers in this city and Milwaukee have their output sold well through the first half of next year. We quote By-product and Connellsville grades at $6.65 to $7, and Virginia at $6.25 to $6.50 f.o.b. Chicago.

Old Material.—The scarcity of Relaying Rails is more pronounced at present than at any time in the history of the trade, owing to the inability of the mills to make shipments of new sections to meet current needs. Hence Western roads are not offering their Relayers, but are using them for sidings for the many industrial plants that are locating along their lines. Sections 56 lb. and heavier are quoted at $31 to $32, and only small lots are to be had at these prices. Car Wheels have again been advanced and are quoted at $25 to $25.25, a sale of 500 tons having been made on the former basis. Mill Scrap is easier, although prices are unchanged. An aggregate of 7000 tons of Old Material will be disposed of by the Atchison, Topeka & Santa Fé, Chicago, Milwaukee & St. Paul, Chicago, Rock Island & Pacific and the Chicago & Eastern Illinois railroads. We revise quotations on gross tons, car lots, f.o.b. Chicago, as follows:

Old Iron Rails	$28.00 to $29.00
Old Steel Rails, 4 ft. and over	21.50 to 22.00
Old Steel Rails, less than 4 ft	20.50 to 21.00
Heavy Relaying Rails, subject to inspection, 50 lb. and under	31.00 to 32.00
Old Car Wheels	25.00 to 25.25
Heavy Melting Steel Scrap	17.50 to 18.00
Frogs, Switches and Guards	18.00 to 18.50
Mixed Steel	15.00 to 15.50

The following quotations are per net ton:

Iron Fish Plates	$23.00 to $23.50
Iron Car Axles	27.50 to 28.00
Steel Car Axles	23.50 to 24.00
No. 1 Railroad Wrought	17.50 to 18.00
No. 2 Railroad Wrought	16.50 to 17.00
Railway Springs	16.00 to 16.50
Locomotive Tires, smooth	16.00 to 16.50
No. 1 Dealers' Forge	13.50 to 14.00
Mixed Busheling	12.50 to 13.50
Iron Axle Turnings	11.00 to 11.50
Soft Steel Axle Turnings	11.00 to 11.50
Machine Shop Turnings	11.00 to 11.50
Cast Borings	9.00 to 9.50
Mixed Borings, &c	9.00 to 9.50
No. 1 Mill	10.50 to 11.00
No. 2 Mill	9.50 to 10.00
No. 1 Boilers, cut to Sheets and Rings	12.50 to 13.00
No. 1 Cast Scrap	17.50 to 18.00
Stove Plate and Light Cast Scrap	14.00 to 14.50
Railroad Malleable	18.00 to 18.50
Agricultural Malleable	17.00 to 17.50

Pittsburgh.

PARK BUILDING, December 12, 1906.—(*By Telegraph.*)

Pig Iron.—The market continues quiet, as far as sales are concerned, but there is a fair amount of inquiry. The opinion is growing that we have reached the top of the market on Pig Iron for the time being at least, and that prices are as high as they will go. For this reason consumers who are covered for the first quarter or first half of next year are not inclined to buy further ahead at present high prices, but are holding off, believing they will be able to do better when they have to come into the market to buy. Bessemer Iron for reasonably prompt shipment has sold in very small lots at close to $24, at Valley Furnace, but the legitimate market remains at $22.50 to $23, at furnace. It has been offered for delivery through the entire second half of next year at $21, at furnace, and declined. There is not much inquiry for Foundry Iron, consumers being covered, but prices remain very high. We note sales of 1000 to 1200 tons of No. 1 Foundry for prompt delivery on the basis of $25, at furnace. This price is equal to $24.50 for No. 2. We may state that Northern No. 2 Foundry for first quarter delivery is offered at $23 to $23.50, at furnace. There is not much inquiry for Forge Iron, Northern brands being held at about $22, at furnace, or $22.85, Pittsburgh.

Steel.—There is but little new demand, most consumers being covered by contracts. Bessemer Billets remain at $29.50 to $30, and Open Hearth, $32 to $32.50, Pittsburgh. Sheet and Tin Bars in random lengths are held at $29.50 to $30, Pittsburgh. We note a sale of 1000 tons of Cut Bars at $30.50, delivered, carrying a freight rate of 95c.

(*By Mail.*)

An advance of 25c. a ton in freight rates on Pig Iron, Steel, Coke and other products between Pittsburgh and the Mahoning and Shenango valleys is said to be under consideration. The present rate on Pig Iron is 85c. and on Billets and Muck Bar 95c. a ton. It is probable that if the advance is made it will go into effect about February 1. There is a good deal of inquiry for Pig Iron for the last half of next year, but so far practically nothing has been done. As noted last week, the supply of Steel, particularly in Sheet and Tin Bars, shows signs of getting larger, and it is believed that early in the new year consumers will have less trouble in getting deliveries. No further advances have been made in prices on Finished Iron and Steel, but it is expected that Sheets and Tin Plate may be marked up before long.

Ferromanganese.—Inquiry is good, particularly for delivery in first quarter and first half of next year, and prices are very firm. We quote 80 per cent. at $85 to $87.50, Pittsburgh, for prompt delivery, and at $80 to $82.50 for deliveries running through the first half.

Wire Rods.—We quote nominally $37 for Bessemer Rods and $38 for Open Hearth, f.o.b. Pittsburgh. The supply of Rods is limited and it is probable that higher prices than we quote would be paid for prompt delivery.

Muck Bar.—This article continues very scarce, mills that make Muck Bar having all the tonnage on their books that they can take care of for some time. We continue to quote best grades, made from all Pig Iron, at from $36 to $37, and from part Scrap at about $34, Pittsburgh.

Skelp.—It is hard to find mills that are in position to make prompt deliveries, especially on Iron Skelp, prices on which are very strong. Specifications on contracts already on the books of the mills will keep them filled up for the next three or four months. A recent order for Line Pipe from Burmah, India, just placed with the National Tube Company, will require about 35,000 tons of Steel Plates, 35½ in. wide. We quote: Grooved Steel Skelp, 1.65c. to 1.70c.; Sheared Steel Skelp, 1.70c. to 1.75c.; Grooved Iron Skelp, 1.75c. to 1.80c.; Sheared Iron Skelp, 1.85c. to 1.90c., Pittsburgh, these prices depending on widths and gauges.

Structural Material.—A fair amount of tonnage has been placed, but this is usually the dull season in the Structural trade, and conditions are likely to be rather quiet for the next month or two. We quote: Beams and Channels, up to 15-in., 1.70c.; over 15-in., 1.80c.; Angles, 3 x 2 x ¼ in. thick up to 6 x 6 in., 1.70c.; 8 x 8 and 7 x 3½ in., 1.80c.; Zees, 3-in. and larger, 1.70c.; Tees, 3-in. and larger, 1.75c. Under the Steel Bar card Angles, Channels and Tees under 3-in. are 1.60c., base, for Bessemer and Open Hearth, subject to half extras on the Standard Steel Bar card.

Plates.—The tonnage being placed with the mills continues enormously heavy, some being filled up for the next four months or longer. The minimum of the market is 1.70c., but several of the Eastern mills are quoting on the basis of 1.80c., Pittsburgh. A great deal of work will likely be done next year in the laying of gas and oil lines in the West, and these projects will require a heavy tonnage of Plates. The market is firm, and we quote: Tank Plates, ¼ in. thick, 6¼ in. up to 100 in. in width, 1.70c., base, at mills, Pittsburgh. Extras over this price are as follows:

	Extra per 100 lb.
Gauges lighter than ¼-in. to and including 3-16-in.	
Plates on thin edges	$0.10
Gauges Nos. 7 and 8	.15
Gauge No. 9	.25
Plates over 100 to 110 in.	.05
Plates over 110 to 115 in.	.10
Plates over 115 to 120 in.	.15
Plates over 120 to 125 in.	.25
Plates over 125 to 130 in.	.50
Plates over 130 in.	1.00
All sketches (excepting straight taper Plates varying not more than 4 in. in width at ends, narrowest end being not less than 30 in.)	.10
Complete Circles	.20
Boiler and Flange Steel Plates	.10
"A. B. M. A." and ordinary Firebox Steel Plates	.20
Still Bottom Steel	.30
Marine Steel	.40
Shell Grade of Steel is abandoned.	

TERMS.—Net cash 30 days. For anticipated payments a maximum discount may be allowed at the rate of 6 per cent. per annum and for a longer time than 30 days interest shall be charged at the same rate per annum. Invoices paid within 10 days from date thereof, discount of ½ of 1 per cent. is allowable. Pacific Coast base, 1.60c., f.o.b. Pittsburgh, with all rail tariff rate of freight to destination added, no reduction for rectangular shapes 14 in. wide down to 6 in. of Tank, Ship or Bridge quality.

Sheets.—The demand for both Black and Galvanized Sheets is not so active as it was some time ago, but a fair amount of new tonnage is being placed, and the leading mills have their product sold up to March or later. Stocks in the hands of jobbers are light, and specifications on contracts continue to come in very freely. The market is firm, any concessions in prices heretofore existing having been withdrawn, owing to the continued scarcity and high prices of Sheet Bars. We quote: Blue Annealed Sheets, No. 10 gauge and heavier, 1.80c.; Nos. 11 and 12, 1.85c.; Nos. 13 and 14, 1.90c.; Nos. 15 and 16, 2c.; Box Annealed, Nos. 17 to 21, 2.35c.; Nos. 22 to 24, 2.40c.; Nos. 25 and 26, 2.45c.; No. 27, 2.50c.; No. 28, 2.60c.; No. 29, 2.75c.; No. 30, 2.85c. We quote Galvanized Sheets as follows: Nos. 10 and 11, 2.55c.; Nos. 12 and 14, 2.65c.; Nos. 15 and 16, 2.75c.; Nos.

17 to 21, 2.90c.; Nos. 22 and 24, 3.05c.; Nos. 25 and 26, 3.25c.; No. 27, 3.45c.; No. 28, 3.65c.; No. 29, 3.90c., and No. 30, 4.15c. We quote No. 28 Gauge Painted Roofing Sheets at $1.85 per square, and Galvanized Roofing Sheets, No. 28 gauge, $3.15 per square for 2-in. corrugations. These prices are for carload lots, jobbers charging the usual advances for small lots from store.

Hoops and Bands.—Practically no new business is being placed, but specifications on contracts are coming in freely and the mills are filled with work for months. The market is firm and we quote: Steel Hoops, 2c., and Bands for all purposes at 1.60c., base, half extras, as per Standard Steel card. These prices are for carload lots, f.o.b. Pittsburgh, plus full tariff rail rate to point of delivery, an advance of $2 a ton being charged for less than carloads.

Tin Plate.—This is the dull season. While a small amount of new business is being placed, large consumers covered their requirements some time ago, deliveries on these contracts in some cases running into the third quarter of next year. There is still a belief that another advance may be made before long, but nothing official about this has been given out by the leading interest. Prices of Tin Bars and Pig Tin are unusually high and an advance in labor becomes operative January 1, from which it would seem that the market on Tin Plate would stand a further advance. We quote $3.90 per base box, f.o.b. Pittsburgh, for 14 x 20 100-lb. Cokes, terms 30 days, less 2 per cent. off for cash in 10 days, on which price a rebate of 5c. a box is allowed for carload and larger lots.

Railroad Spikes.—The makers are catching up to some extent on deliveries of the larger sizes, but there is a great scarcity of the smaller sizes on which the mills are from six to eight weeks behind. The demand continues heavy and the market is firm. We quote Railroad Spikes at $2.40 to $2.50 per 100 lb. on contracts for extended delivery, while for prompt shipment $2.75 and higher is quoted.

Merchant Steel.—Large consumers are well covered by contracts for four to six months ahead on which they are specifying freely, and shipments by the mills are heavy. In most cases the mills are from four to six weeks or longer behind in deliveries. We quote: Smooth Finished Merchant Steel, 1.85c.; Flat Sleigh Shoe, 1.50c. to 1.55c.; Cutter Shoe, 2.15c. to 2.20c.; Railroad Spring Steel, 1.75c. to 1.80c.; Toe Calk Steel, 2.10c. to 2.15c.; Crucible Tool Steel, 6c. to 8c. and upward, depending on quality. It is stated that official prices on Shafting are being firmly held, these being 50 per cent. off in carload lots and 45 per cent. in less than carloads, delivered in base territory.

Iron and Steel Bars.—Several Western railroads are in the market for large tonnages of Iron Bars, but are having trouble finding mills that can make deliveries wanted. New business in both Iron and Steel Bars continues heavy and prices are very firm. All the mills are from six to eight weeks or longer behind in deliveries of Steel Bars, while mills rolling Iron Bars are practically as far behind. Local makers of Iron Bars continue to quote 1.80c. to 1.85c., Pittsburgh, but we note that some of the Eastern mills are offering Iron Bars at slightly less than these prices, delivered in the Pittsburgh District. We quote Steel Bars at 1.60c. to 1.65c., base, half extras, f.o.b. Pittsburgh.

Spelter.—The market continues firm, the demand from the large consumers like the Steel manufacturers and brass concerns being unusually heavy. We quote prime grades of Western at 6.30c. to 6.35c., St. Louis, equal to 6.42½c. and 6.47½c. Pittsburgh.

Pipes and Tubes.—The United States Steel Products Export Company has secured an order for 285 miles of 10-in. Line Pipe for delivery to the Burmah Oil Company, at Burmah, India. It will be Steel Pipe, and will be made by the National Tube Company. The original inquiry was for Iron Pipe, but none of the mills was in position to furnish Iron. This Pipe will weigh 40 lb. to the foot, and the order amounts to nearly 30,000 tons. To make this Pipe there will be required about 35,000 tons of Plates 35½ in. wide. No other large contracts for gas or oil lines have been placed the past week, but a good deal of business is pending, including some large tonnage for a gas line for Indian Territory, and also for other projects. Indications are that the demand through all of 1907 for the larger sizes of Pipe used for gas and oil lines will be enormously heavy, and will tax the capacity of the mills to meet it. The general demand for Pipe is strong, and the mills are well filled up for the next two or three months. The market is firm at the recent advance of $2 a ton. The extreme discount on Merchant sizes of Steel Pipe is 78 and 5 per cent. off to the large trade. The official discounts, which are shaded one point or more to the large trade, are as follows:

Merchant Pipe.

	Jobbers, carloads.			
	Steel.		Iron.	
	Black.	Galv.	Black.	Galv.
	%	%	%	%
⅛ and ¼ in.	69	53	65.5	49.5
⅜ in.	71	57	65.5	57.5
½ in.	73	61	73.5	63.5
¾ to 6 in.	77	67	73.5	63.5
7 to 12 in.	72	57	69	54
Extra strong, plain ends:				
⅛ to ⅜ in.	62	50	58.5	46.5
½ to 4 in.	69	57	65.5	53.5
4½ to 8 in.	65	53	61.5	48.5
Double extra strong, plain ends:				
½ to 8 in.	58	47	53.5	42.5

Boiler Tubes.—A much heavier demand for Locomotive and Merchant Tubes is expected after the first of the year, as a good many contracts expire on December 31, and it is probable that on all such contracts any tonnage not taken out within the specified time will be canceled. The demand for Merchant Tubes is active, and some large contracts for Locomotive Tubes for delivery next year have recently been placed. Official discounts are as follows:

Boiler Tubes.

	Iron.	Steel.
1 to 1½ in.	45	50
1¾ to 2¼ in.	45	62
2½ in.	50	64
2¾ to 5 in.	57	70
6 to 13 in.	45	62

Iron and Steel Scrap.—We note a continued active demand for Scrap and the market is firm, but prices are no higher than were quoted in this report last week. It is probable there will be a slight cessation in buying now that we are so close to the end of the year, but an active buying movement shortly after January 1 is confidently expected by dealers. Prices are firm as follows: Heavy Steel Melting Scrap $20 for Pittsburgh or Sharon delivery; No. 1 Wrought Scrap, $21 to $21.50; No. 2 Wrought Scrap, $19 to $19.50; Old Steel Rails, short pieces, 6 ft. and under, for Open Hearth purposes, $20; Old Steel Rails, Rerollers, $22.50; Wrought Turnings, $15.50 to $15.75; Low Phosphorus Melting Stock, $25; Bundled Sheet Scrap, $17.25 to $17.50; Cast Iron Borings are $13 to $13.25; Old Car Wheels, $25; Steel Axles, $24; No. 1 Cast Scrap, $20; Railroad Malleable, $19 to $19.50; Cast Iron Borings, $12.75 to $13; Iron Axles, $32 to $33; Stove Plate, $16 to $16.50, and Grate Bars, $15.50. All prices are per gross ton, f.o.b. Pittsburgh, unless otherwise specified.

Coke.—Both Furnace and Foundry Coke continue scarce for prompt delivery and bring high prices. Strictly Connellsville Furnace Coke for prompt shipment has sold at $3.50 to $3.60, at oven, while on contracts for first half of next year from $3.10 to $3.25 is quoted. Connellsville 72-hr. Foundry Coke has sold for prompt shipment at $4.25, at oven, while on contracts $3.75 to $4 and higher is quoted. The output of Coke continues heavy, the Upper and Lower Connellsville regions having turned out last week 414,687 tons, an increase over the previous week of about 13,000 tons. A large number of new Coke ovens are being built in both the Upper and Lower Connellsville regions, some of which will be ready for operation in January and February.

Cincinnati.

FIFTH AND MAIN STS., December 12, 1906.—(*By Telegraph.*)

Pig Iron.—While a limited tonnage is moving at all times for spot delivery there is an absence of that nervousness that characterized the market several weeks since. It begins to look as though most of the available tonnage had been disposed of for shipment the first quarter, and the interest now manifest is centered on second quarter business. While reports indicate some development covering third quarter and even last half, it is perhaps a little previous to expect consumers to anticipate such a distance into the future, even if the furnaces were disposed to quote on such deliveries, which in many instances they are not. The imaginary line that is supposed to exist between prompt shipment, December, and forward delivery, beginning January, is gradually becoming effaced, and both deliveries may practically be embodied in the same quotation. This is well established at $22 to $23, Birmingham, the minimum figure representing first quarter, with prompt shipments averaging $22.50. Second quarter delivery is still quotable from $18 to $19, Birmingham, while anything later is $17.50 to $18. The Northern situation is practically unchanged, with furnaces well sold up through first quarter, a limited tonnage for second, with sales apparently light beyond that period. A sale of 2000 tons of Bessemer for December delivery is reported at $24, Hanging Rock Furnace. The demand for Gray Forge is light, a fair supply being obtainable at prevailing quotations. Freight rates from Hanging Rock District to Cincinnati are $1.15, and from Birmingham $3. We quote, f.o.b. Cincinnati, as follows:

Southern Coke, No. 1	$26.00 to $27.00
Southern Coke, No. 2	25.00 to 26.00
Southern Coke, No. 3	24.00 to 25.00
Southern Coke, No. 4	23.00 to 24.00
Southern Coke, No. 1 Soft	26.00 to 27.00
Southern Coke, No. 2 Soft	25.00 to 26.00
Southern Coke, Gray Forge	22.00 to 23.00
Southern Coke, Mottled	21.00 to 22.00
Ohio Silvery, 8 per cent.	29.15 to 29.65
Lake Superior Coke, No. 1	25.65 to 26.65
Lake Superior Coke, No. 2	25.15 to 26.15
Lake Superior Coke, No. 3	24.65 to 25.65
Car Wheel Irons.	
Standard Southern Car Wheel	$28.00 to $28.50
Lake Superior Car Wheel	27.00 to 27.50

Coke.—The car situation is becoming more serious, and shipments are subject to more or less delay; prices are strong and the demand good. We quote best brands of Connellsville and Virginia Foundry, $4.15 to $4.50, f.o.b. ovens.

Finished Iron and Steel.—There is no change in the condition of the mills, which are apparently being well covered for the first six months of next year. Prices are strong and the market continues active. We quote, f.o.b. Cincinnati, as follows: Iron Bars, in carload lots, 1.93c., with half extras; the same, in smaller lots, 2.10c., with full extras; Steel Bars, in carload lots, 1.73c., with half extras; the same, in smaller lots, 1.95c., with full extras; Base Angles, 1.83c., in carload lots; Beams and Channels, in carload lots, 1.83c.; Plates, ¼-in. and heavier, 1.83c., in carload lots; in smaller lots, 2c.; Sheets, 16 gauge, in carload lots, 2.15c.; in smaller lots, 2.70c.; 14 gauge, in carload lots, 2.05c.; in smaller lots, 2.60c.; Steel Tire, 1 x ¼ in. or heavier, 1.93c., in carload lots.

Old Material.—An unusual degree of activity prevails and dealers are piling no stock. Prices fluctuate somewhat, but are nevertheless strong. We quote dealers' prices, f.o.b. Cincinnati, as follows:

No. 1 Railroad Wrought, net ton	$17.50 to $18.00
Cast Borings, net ton	9.25 to 9.50
Steel Turnings, net ton	11.50 to 12.50
No. 1 Cast Scrap, net ton	16.50 to 17.50
Old Iron Axles, net ton	26.50 to 27.50
Old Iron Rails, gross ton	26.75 to 27.25
Old Steel Rails, long, gross ton	19.00 to 20.00
Relaying Rails, 56 lb. and up, gross ton	28.50 to 29.50
Old Car Wheels, gross ton	22.50 to 23.00
Low Phosphorus Scrap, gross ton	21.00 to 21.50

Geo. W. Douglas, who for the past two years has been connected with the sales department of Rogers, Brown & Co., Cincinnati, will, on January 1, occupy a similar position with their St. Louis office. Fred. W. Bauer, for two years past connected with the St. Louis office of this firm, will return January 1 to Cincinnati and represent it in the same territory as before going to St. Louis.

Philadelphia.

PHILADELPHIA, December 11, 1906.

The condition of the Iron market is simply without a parallel. The volume of business has been so enormous for months that one would naturally expect something of a reaction toward the end of the year, but there is no more sign of it now than there has been at any time in the past three or four months. Everything is practically sold up for the first half of the year, so that quotations for that delivery are practically eliminated. Many of the large companies are beginning to consider the first half of the year as spot Iron, and spot Iron is something that requires special negotiation before prices can be arranged. There is now considerable business being done for the last half of the year, but at all sorts of irregular prices. Some prominent sellers who have marked up their spot Iron to $25 at furnace make a rate of $2 less for the last half of the year. Others, however, are unwilling to recognize any difference between the first half and the last half, and if they make any difference at all it is not more than 50c. to $1 a ton, but such a thing as exact quotations for any delivery is not practicable in an article of this kind, as conditions vary in almost every instance, which if all the conditions were known would tend to equalize the apparent difference in prices. The inside quotation for No. 2 X Foundry is $24.50 to $25 delivered, but this by no means implies that there is Iron for sale at that price. If a regular customer makes application for material, the question is taken up on its merits, and if there is any prospect of being able to deliver Iron during the period desired he can probably get it at the quoted rate. But opportunities of this kind are so rare as to be hardly worth serious consideration. It is felt, however, that for the last half of 1907 there is an element of speculation in anything that may be done, and while some have courage enough to place large orders, a good many are disposed to take the chances awhile longer, as many things might happen in six months' time. Foreign Iron is sold as fast as it arrives. One cargo is a week past due, and one or two others nearly due are also largely sold to arrive. Prices have advanced on the other side, but for the present regular buyers of these grades are able to get what they want at the rates quoted below. It is now estimated that the total sales for American account are about 200,000 tons, so that there is yet a considerable quantity to arrive. Basic Iron is also well cleaned up, but for such deliveries as can be arranged for next year it is held at about $22.50 to $23. One good sized lot, however, for December shipment was sold at $23.50 delivered at a Schuylkill Valley point. The furnace report, which is expected to appear in *The Iron Age* this week, will be at least interesting, even if it is not as satisfactory as could be desired, consumers devoutly hoping that the output will show considerable increase. So far, however, the shortage appears to be as stringent as ever, with many indications that more Iron is wanted than can be supplied.

Pig Iron.—It is now tolerably clear that all the large producers of Pig Iron have closed their books for the first half of the coming year. There is a little demand for spot Iron, but the available surplus is so small that buyers have a hard time in getting even what little they require. Of course, the current output of the furnaces (besides the imported Iron) is going into consumption as rapidly as it can be delivered, so that the available working supply is certainly more than 500,000 tons a week. This by no means represents an impoverished condition, although there is enough of a shortage to give some anxiety in regard to the next two or three months. These conditions reveal a situation of prosperity which may well be designated as unparalleled, and so far as anyone can see, there is no probability that we are anywhere near the culminating point, although it should not be forgotten that it is usually the unexpected that happens. Nevertheless, so long as there is a free movement along the entire line, it may reasonably be assumed that business will continue good until there are at least some indications of a change in the current, which is not at present anywhere in sight. Negotiations which are now in progress are, therefore, mostly for deliveries during the last half of the year, excepting for such small lots as may be obtainable for immediate delivery. Prices, as we have already intimated, are not entirely settled for that delivery, as producers entertain a variety of views in regard to that matter. Some are disposed to think that prices will be higher, and are therefore not quoting at all unless at the full prices realized during the past few weeks for deliveries during the first half of the year. Others again are more inclined to advance their figures for what little surplus they may have from time to time during the next six months, and to make important concessions for late deliveries. Consequently, with such divergent views, it is extremely difficult to give exact quotations for any delivery. It may be said, however, that one large selling interest is not averse to taking business at $23 to $23.50 for No. 2 X, last half 1907, while for the first and second quarters it would quote $25 or better for any little surplus which it may have to offer. It would appear, therefore, that the extreme range of prices would be from $23 to $26 for No. 2 X Foundry, according to date for delivery. Gray Forge Iron is dearer and may be quoted $22 to $22.50 for Standard qualities, with considerable sales having been made at these figures within the last few days. Pipe foundries have taken quite a heavy tonnage for the last half at about $22 delivered. Steel making Irons are extremely dull, and, as there are no offerings, consumers are disposed to remain in the background until there is some reasonable chance that they can get Iron without paying much, if any, advance over to-day's quotations. In a general way quotations for deliveries during the first half of the year in Eastern Pennsylvania or adjoining territory would be about as follows:

No. 1 X Foundry	$26.00 to $26.50
No. 2 X Foundry	24.50 to 25.00
No. 2 Plain	24.00 to 24.50
Standard Gray Forge	21.50 to 22.00
Basic	22.50 to 23.00
Low Phosphorus	27.25 to 27.75
Malleable	25.50 to 26.50
Middlesbrough No. 1, on dock	22.75 to 23.00
Middlesbrough No. 3, on dock	21.75 to 22.00
Scotch, on dock	24.00 to 24.50

Ferroalloys.—Business has again been quite active in this department, and prices are decidedly dearer. For the first quarter deliveries $80 to $82, seaboard, would be about the best that could be done, and from $1 to $2 less for the second quarter. Ferrosilicon is still scarce, and would probably command $110 to $115, as there is little of this material that could be made immediately available.

Steel.—The demand is heavy, and mills are doing the best they can to meet the situation, but prompt shipments are almost out of the question at the present time. Prices, however, are unchanged at $33 to $34 for Ordinary Rolling Billets, and $36 to $40 for Forging Billets.

Plates.—Considering the advance which has recently been made, the demand is surprisingly heavy. There is an impression, however, that prices will have to be marked up again in the near future, as there seems to be no end to the advance in raw material, so that the disproportion in prices is almost as large as it was before the recent advance. For the present, prices are as follows:

	Carload. Cents.	Part carload. Cents.
Tank, Bridge and Boat Steel	1.93½	1.98½
Flange or Boiler Steel	2.03½	2.08½
Marine	2.33½	2.38½
Locomotive Firebox Steel	2.43½	2.48½

The above are base prices for ¼-in. and heavier. The following extras apply:

	Extra per 100 lb.
3-16 in. thick	$0.10
Nos. 7 and 8, B. W. G.	.15
No. 9, B. W. G.	.25
Plates over 100 to 110 in.	.05
Plates over 110 to 115 in.	.10
Plates over 115 to 120 in.	.15
Plates over 120 to 125 in.	.25
Plates over 125 to 130 in.	.50
Plates over 130 in.	1.00

Structural Material.—Prices in this department appear

to be an exception, inasmuch as no advance has been made for many months past. This is due in some measure, perhaps, to the increase in the capacity for production which has been made during the past year, amounting, it is estimated, to not less than 50 per cent. The actual tonnage is much greater than at any previous time, although, as we said before, it is met by a productive capacity in proportion. Prices are unchanged, as follows: Beams, Channels and Angles, 1.83½c. to 2c., according to specifications.

Bars.—There is a heavy demand for Bars. At. 1.83½c. for Refined Bar Iron there is no difficulty in securing all the business that a mill wants. In most cases, however, mills ask about 1.88½c., failing which they accept only the best class of business at the lower figure. Steel Bars are nominally 1.73½c., but promises for delivery are so indefinite that buyers are willing to pay a tenth more so long as they can be sure of getting reasonably prompt shipments. Prices of both Iron and Steel Bars may therefore be quoted at 1.83½c. to 1.88½c.

Sheets.—A good demand is being enjoyed at the full prices of last week, which, it will be noted, are a tenth dearer than they were during the previous week, quotations now being as follows for mill shipments, and a tenth additional for smaller quantities: Nos. 18 to 20, 2.70c.; Nos. 22 to 24, 2.80c.; Nos. 25 to 26, 2.90c.; No. 27, 3c., and No. 28, 3.10c.

Old Material.—The market is not as active as it was a week ago, simply because almost everything in sight has been taken up. This, of course, places the mills in a somewhat better position as regards supplies, although there is no probability that prices will be lower than they are at present, as supplies are expected to be extremely small during the winter months. Bids and offers for material delivered in buyers' yards are about as follows:

Steel Crops	$20.00 to $20.50
No. 1 Steel Scrap	19.50 to 20.00
Low Phosphorus	24.00 to 24.50
Old Steel Axles	24.50 to 25.00
Old Iron Axles	32.00 to 32.50
Old Iron Rails	27.75 to 28.25
Old Car Wheels	23.00 to 23.50
Choice No. 1 R. R. Wrought	23.25 to 23.75
No. 1 Yard Scrap	21.50 to 22.00
Long and Short	19.50 to 20.00
Machinery Scrap	21.50 to 22.00
Wrought Iron Pipe	17.25 to 17.50
No. 1 Forge Fire	17.00 to 17.50
No. 2 Light	12.00 to 12.50
Wrought Turnings	16.00 to 16.50
Axle Turnings	17.00 to 17.50
Stove Plate	17.00 to 17.50
Cast Borings	13.00 to 13.50
Grate Bars	15.50 to 16.00

Birmingham.

BIRMINGHAM, ALA., December 9, 1906.

Pig Iron.—Spot Iron continues easy and is now quoted at $22 to $23. For next year very little is offered for delivery during the first quarter, and some of the larger interests state that they have advised their agents this is the "last call" for orders for delivery during the second quarter, their estimated production for the entire first half being practically booked, and that they will soon withdraw from the market for this period. Somewhat more interest is being taken in third quarter, but as there is such a difference of opinion between buyers and sellers only a limited tonnage has as yet been booked. Efforts to relieve the car situation have been without avail, several furnaces having been banked on this account, and more will go out of blast as the holiday season approaches, the labor situation being such that it will be absolutely impossible to supply sufficient raw material during this period to keep them all going. The railroads centering here are apparently making every effort to relieve the situation, and to this end have shortened the territory of each superintendent to about one-half what he formerly had, in order that he may give the operating department his personal attention. For some time it has not been an unusual thing for loaded cars to remain from two to three weeks in the yards here before being placed for unloading or forwarded to destination, and this, more than any other thing, has been responsible for the shortage of cars. Under the new order of things it is expected that this delay will be largely overcome and the situation considerably improved, but at best it will be far from satisfactory, as the tonnage now offered is larger than the single tracked Southern roads can handle without more or less congestion, no matter how systematically they may be conducted.

The furnace which the Southern Steel Company recently bought at Rising Fawn, Ga., has been blown out for general repairs. It will be brought up to the high standard of this company's other works, going back in blast about February 1.

Cast Iron Pipe.—Consumers of Cast Iron Pipe are becoming educated to paying higher prices, and are now making contracts more freely than for the past few months. Spot to $5 above forward delivery price is being readily paid. The shipments are in considerable demand, and on these from $2 business for next year will be something enormous, and, as perhaps more Pipe than ever before will be laid in the South, the foundries in this district are holding their order books open in anticipation. In addition to what New Orleans is to contract for the latter part of January, eight other Southern cities will open bids next month. All the foundries here have their output for the first quarter of next year practically booked, and for the second are quoting approximately as follows on Water Pipe: 4 to 6 in., $34; 8 to 12 in., $33; over 12-in., $30, with $1 per ton extra for Gas Pipe.

Old Material.—The activity of the Scrap market continues, all grades being in urgent demand. Deliveries are being delayed to some extent, owing to inability to secure sufficient labor for loading, while melters are urging shipment before suspension for the holidays. Scarcity of cars is having its effect on the market, and offerings of Scrap already loaded on cars find ready buyers. Some Wrought is being held for higher prices, but with this exception stocks are at a minimum. We quote as follows per gross ton f.o.b. cars dealers' yards here:

Old Iron Rails	$21.50 to $22.00
Old Iron Axles	19.00 to 19.50
Old Steel Axles	17.00 to 18.00
Old Car Wheels	18.50 to 19.50
No. 1 Railroad Wrought	19.00 to 19.50
No. 2 Railroad Wrought	15.50 to 16.00
No. 1 Country Wrought	15.50 to 16.00
No. 2 Country Wrought	12.50 to 13.00
Wrought Pipe and Flues	13.00 to 13.50
Railroad Malleable	13.00 to 13.50
No. 1 Steel	14.00 to 14.50
No. 1 Machinery Cast	15.00 to 15.50
Stove Plate and Light Cast	11.00 to 11.50
Cast Borings	8.00 to 8.50

New York.

NEW YORK, December 12, 1906.

Pig Iron.—Buying for the second half of 1907 has been the feature of the past week, New England being the principal center of activity. Prices vary, being $1 a ton below the recent sales for the first half in some cases; in others no difference is made between second and third quarters. Foreign Iron is coming in steadily, but new buying abroad by local dealers is lighter, as deliveries cannot be promised much before March. Southern Iron has dominated the Eastern market in the past week, Northern makers being not so ready to sell for the second half. We quote Northern Irons for delivery in the first half at $26 to $27 for No. 1 Foundry, $24.50 to $25 for No. 2 Foundry and $24 to $24.50 for No. 2 Plain. Southern Iron for delivery in the second half of 1907 has sold at $23, f.o.b. New York harbor for No. 2. Scotch Iron is higher, selling at $24.50 to $25, ex-ship, duty paid. No. 1 Middlesbrough has sold at $23 to $23.50, and No. 3 at $22 to $22.50.

Steel Rails.—The principal order reported in the week is 33,000 tons for the Georgia & Florida Railroad, taken by the Pennsylvania Steel Company. The Detroit, Toledo & Ironton took 6000 tons, the Duluth & Northern Minnesota 1000 tons, the Pacific Traction Company 1000 tons, while miscellaneous orders amounted to 3500 tons.

Structural Material.—The mills appear to be falling behind the accumulation of specifications, after two or three months in which they gained on their contracts. The Blackwell's Island Bridge approaches, calling for 8000 tons of Steel, constitute the principal new business. Bids will be opened to-morrow. The Pope Building at Cleveland, Ohio, requiring 2500 tons, is being figured on, and there have been a number of railroad bridge contracts, involving a few hundred tons each. Specifications are heavier this week. No expectation of an early advance in prices is entertained. We quote on tidewater deliveries, mill shipments, as follows: Beams, Channels, Angles and Zees, 1.84½c.; Tees, 1.89½c.; Bulb Angles and Deck Beams, 1.99½c. On Beams 18 to 24 in. and Angles over 6 in. the extra is 0.10c. Sales out of stock of material cut to length continue to be made at 2¼c. to 2½c.

Bars.—The demand for Bar Iron is excellent, with few manufacturers quoting under 1.89½c. tidewater. An interesting episode, which shows how confident some manufacturers are of the future, occurred this week when a buyer in this city asked for quotations on 500 tons of Refined Bar Iron for delivery in the first three months of next year, and one mill quoted a price slightly over 2c., New York. Steel Bars continue to be quoted at 1.74½c. to 1.84½c., tidewater, according to time of delivery.

Plates.—The market on moderate sized lots in this locality appears to be firmly established at the new rate of 1.94½c., tidewater, on Tank Plates made by the Eastern mills. Orders are steadily being booked at this rate. Larger quantities are being taken by the mills located in Western Pennsylvania, which are still quoting on the basis of 1.70c., Pittsburgh, or 1.84½c., tidewater. Among the orders thus placed during the week was one of 500 tons. Quotations are as follows at tidewater in carload lots: Sheared Tank Plates, 1.84½c. to 1.94½c.; Flange Plates, 1.94½c. to 2.04½c.; Marine Plates, 2.24½c. to 2.34½c.; Firebox Plates, 2.34½c. to 2.70c., according to specifications.

Cast Iron Pipe.—The Consolidated Gas Company of this city has placed contracts for 6000 tons, and local contractors have purchased together about 3000 tons of Water Pipe. The volume of inquiries is large, and the demand appears to be coming from all points of the country. As far as can be ascertained, no 6-in. Pipe is now available from any foundry before February, while quite a number of them are sold up on small sizes well into the spring months. On large sizes deliveries can still be made in January by a number of foundries. Prices are firm at $34.50 to $35 per net ton, tidewater, for 6-in. Pipe, without regard to time of delivery.

Old Material.—The demand for all kinds of Old Material is quite heavy, but particularly for Foundry material. One of the leading dealers made sales of all classes of Scrap aggregating 10,000 tons the past week. Although railroad offerings are liberal, they are not large enough to meet the heavy demand now experienced. There is still a good sized short interest in this market, comprised of dealers who sold Heavy Melting Steel Scrap some time back at lower prices than now ruling, who have not yet covered their contracts. The demand from this source, as well as the regular trade from consumers, is expected to keep Steel Scrap firm, with a possibility of higher prices in January or February. Machinery Cast Scrap, Stove Plate, Cast Borings and Wrought Turnings are all exceedingly strong, and prices are somewhat higher than could have been obtained last week. Relaying Rails are in considerable demand in some sections, especially the South, despite the lateness of the season, but few are being offered by railroads in this vicinity. Approximate prices for New York and vicinity per gross ton are as follows:

Old Iron Rails	$25.00 to $25.50
Relaying Rails	28.00 to 29.00
Old Steel Rails, rerolling lengths	18.50 to 19.00
Old Steel Rails, short pieces	16.25 to 16.75
Heavy Melting Steel Scrap	16.25 to 16.75
Standard Hammered Iron Car Axles	29.00 to 30.00
Old Steel Car Axles	21.50 to 22.50
No. 1 Railroad Wrought	21.00 to 21.50
Iron Track Scrap	18.00 to 18.50
No. 1 Yard Wrought, long	18.50 to 19.00
No. 1 Yard Wrought, short	18.00 to 18.50
Wrought Pipe	14.50 to 15.00
Light Iron	10.00 to 11.00
Cast Borings	10.00 to 11.00
Wrought Turnings	14.00 to 14.50
Old Car Wheels	21.50 to 22.00
No. 1 Machinery Cast	18.50 to 19.50
Stove Plate	15.00 to 15.50
Grate Bars	14.00 to 14.50
Malleable Cast	18.00 to 19.00

Tonnage of Eight Naval Powers.—Data issued by the Office of Naval Intelligence of the Navy Department show the following standing in tonnage of the eight principal naval powers, the figures in the first column including those built, and the second column including both built and building:

Great Britain	1,640,765	1,851,854
France	609,937	799,257
United States	525,970	731,196
Germany	457,480	568,160
Japan	348,141	452,391
Russia	254,040	375,925
Italy	202,993	285,317
Austria	113,527	130,727

It is stated that the tables include no vessels of under 1000 tons, except torpedo craft above 50 tons; no vessel over 20 years old, unless reconstructed or rearmed since 1900, and no transports or other auxiliary ships. Great Britain has the largest tonnage under construction, closely followed by the United States and France, respectively. At some distance follow Russia, Germany and Japan, closely grouped. In first-class battleships building the United States has a large lead over France, which is second.

The railroad facilities of the Mahoning and Shenango valleys are to be greatly improved. The Pennsylvania, Erie, Baltimore & Ohio, Pittsburgh & Lake Erie, and Allegheny Western railroads all have plans of this character. The new plants around New Castle have taken up many of the available manufacturing sites, and a belt line railroad is projected to connect with all the railroads and to make additional sites eligible for manufacturing.

The Engineers' Society of Milwaukee announces the following subjects for discussion during the present quarter: Wednesday, December 12, "Preservation of Wood for Commercial Use and Substitute Material;" Tuesday, January 9, "Municipal *vs.* Corporate Ownership of Public Utilities;" Wednesday, February 13, "Single Phase Transmission for Tractive and Other Purposes." Subjects for the succeeding quarter will be announced later, and the season will close with the annual banquet for the June meeting.

Iron and Industrial Stocks.

NEW YORK, December 12, 1906.

Notwithstanding the fact that interest on money has at times been up as high as 36 per cent. on call loans, prices have been very firm. Rates relaxed on Monday under the confident belief that the Secretary of the Treasury would afford measures of relief, and also on announcement that arrangements had been made for beginning the importation of gold. Prices advanced quite sharply on Tuesday as a result. Some important advances were made during the week. Republic common reached the highest point in its history, selling up from 37⅞ on Thursday of last week to 41¾ on Tuesday of this week. Sloss-Sheffield common advanced from 74¼ on Friday to 79⅜ on Tuesday. United States Steel common advanced from 47⅜ on Friday to 49⅜ on Tuesday. Colorado Fuel advanced from 55¼ on Thursday to 58½ on Tuesday. Another stock, which has been steadily gaining strength recently, is Steel Foundries preferred, which advanced from 47 on Thursday to 48½ on Saturday. The range of prices on other active stocks during the period covered from Thursday to Tuesday was as follows: Car & Foundry common 43⅝ to 45¾; Locomotive common 73¾ to 74⅞; Pressed Steel common 54 to 55½; Railway Spring common 55⅛ to 56¾; Cast Iron Pipe common 44¾ to 45½; United States Steel preferred 104½ to 105. Last transactions up to 1.30 p.m. to-day were made at the following prices: United States Steel common 48⅞, preferred 105⅝; Car & Foundry common 43¾, prefered 101¼; Locomotive common 75, prefered 111; Steel Foundries common 11, preferred 48; Colorado Fuel 57⅛; Pressed Steel common 55, preferred 99¼; Railway Spring common 56¼; Republic common 40¼, preferred 98⅝, ex-dividend 3¾; Sloss-Sheffield common 78; Tennessee Coal 163; United States Cast Iron Pipe common 45¼, preferred 86⅝; Can common 6⅝, preferred 55¾.

The Railway Steel Spring Company has made application to the New York Stock Exchange to list $4,362,000 first mortgage 5 per cent. bonds.

The American Car & Foundry Company makes public the following figures of net earnings for the three and six months ended October 31:

	1906.	1905.	Increase.
Three months	$1,779,913	$717,739	$1,062,174
Six months	3,436,966	1,343,050	2,093,916

Great Northern ore land certificates are now regularly dealt in on the New York Stock Exchange. December 6 was the first day of their transfer from the "curb." On the day previous the price on the "curb" advanced from 84 to 87½. The low point touched since their authorization was 79½.

In a statement issued by the Pittsburgh Coal Company covering the business of all its underlying companies excepting the Monongahela River Company for the month of October, the gross earnings are shown to have been $502,444.66, as compared with $319,602.78 in the same month last year. For 10 months ending October 31, 1906, the earnings were $4,216,853.25, as against $2,650,030.57 in the same period last year. The net earnings for October of this year, after deducting depletion of coal lands, allowance for depreciation of plants and interest on first mortgage bonds, were $233,852.06, as against $43,686.97 last year. For 10 months the net earnings this year were $1,640,459.15.

The plan for the acquisition of a majority of the common stock of the Republic Iron & Steel Company by the Tennessee Coal, Iron & Railroad Company is still in abeyance. It is reported that the proposal for some time under discussion for exchanging three shares of the Republic Company's common stock for one share of Tennessee Company stock has been abandoned.

Dividends.—The American Car & Foundry Company has declared the regular quarterly dividend of 1¾ per cent. on the preferred stock and a quarterly dividend of ½ per cent. on the common stock, both payable January 1.

The Ingersoll-Rand Company, New York, has declared a semiannual dividend of 3 per cent. on the preferred stock, payable January 1.

The Standard Screw Company has declared a semiannual dividend of 3 per cent. on the preferred and 2½ per cent. on the common stock, both payable January 1.

The American Smelting & Refining Company has declared a quarterly dividend of 1¾ per cent. on the common stock, payable January 15, and a quarterly dividend of 1¾ per cent. on the preferred stock, payable January 2.

The General Electric Company has declared the regular quarterly dividend of 2 per cent.

J. G. White & Co., Incorporated, New York, has declared a quarterly dividend of 1½ per cent. on the preferred stock, payable January 2.

Cleveland.

CLEVELAND, OHIO, December 11, 1906.

Iron Ore.—Many of the larger dealers have rushed into the market the past week to secure charters for next year, and it is estimated that charters have been signed for carrying fully 3,000,000 tons of Ore. It is understood that the Pittsburgh Steamship Company is about to enter the market for charters. The indications are that vessel capacity for about all the Ore that has already been purchased will be chartered before the end of the year. All the charters that have been made the past week have been at this season's rate—75c. from the head of Lake Superior to Lake Erie ports, 70c. from Marquette and 60c. from Escanaba. These are now considered the established rates for next year. The Ore market is quiet, with prices firm. Prices quoted are $5 for Old Range Bessemer, $4.75 for Mesaba Bessemer, $4.20 for Old Range non-Bessemer, and $4 for Mesaba non-Bessemer. Some dealers, however, are asking slightly higher prices. Low Phosphorus Siliceous Ore is moving slowly at $2.75. Boats have left Lake Superior ports with their last cargoes for the season. No cargoes will reach the Lake Erie ports after the end of this week or the first of next. December shipments will be light, because of the cold weather that has prevailed in the Lake Superior region. The season's Ore shipment will reach but little over 37,000,000 gross tons. The shipments from the Lake Superior District for November were 3,734,167 tons, or 392,938 tons more than were carried the same month a year ago. The total shipments for the season up to December 1 were 36,973,002 tons.

Pig Iron.—The scarcity of Pig Iron continues, with no relief in the situation in sight. One local foundry was forced to shut down this week because it was unable to secure raw material, and others report that their supply of Pig is dangerously low. Spot Pig is strong, but there is practically none to be had. Nearly everything is sold for the first quarter and the same may be said of the second quarter. All foundries are doing more business than they expected, so that few have contracted for sufficient raw material. Northern Foundry is now quoted at $25 and $26, at furnace, for spot and first quarter delivery, but one dealer puts the price at $25 to $28 for the first half, and says he can easily get $27. The price for the second quarter is $23, Valley furnace. Foundry No. 2 for the last half of 1907 is selling at $22, at furnace, the same as a week ago, but one or two dealers have shaded the price to $21.50. Gray Forge is quoted at from 50c. to $1 less than No. 2 Foundry.

Old Material.—The buying demand is not so heavy as two weeks ago. Dealers say that they are covering shorts and are paying more than the consumers. Cast Scrap is the most active on the list, and Steel is a little weaker and somewhat more plentiful. The following are the dealers' prices to the trade, f.o.b. Cleveland, per gross ton:

Old Steel Rails	$20.00 to $20.50
Old Iron Rails	27.00 to 27.50
Old Car Axles	29.75 to 30.25
Old Car Wheels	22.00 to 22.50
Heavy Melting Steel	17.50 to 18.00
Cast Borings	10.50 to 11.00
No. 1 Busheling	17.00 to 17.50
No. 1 Railroad Wrought	20.50 to 21.50
No. 1 Cast	21.00 to 21.50
Iron and Steel Turnings and Drillings	13.25 to 13.75

The Follansbee Bros. Company's Steel Plant.—The new open hearth steel plant of this company, at Follansbee, W. Va., has been started, one furnace having been put in operation December 10 and the other furnace will follow next week, together with the hammer and bar mill departments. The company will then make its own sheet and tin bars for use in its finishing mills and of the quality desired for the special grades of sheets and tin plate which it markets. The steel plant was built under the personal supervision of Wm. Banfield, general manager, and has the most modern equipment throughout.

Transmission at 36,000 volts over the 50 miles separating the hydroelectric station at Cellina, Italy, and Venice is now under way. A fall of 175 ft. is utilized, the available hydraulic power being about 15,000 hp., and about 10,000 hp. is delivered to the city. A dam is thrown across the river in order to increase the head and to provide a storage reservoir for regulation of the flow. A canal 3.3 miles long carries the water to the power house, where it operates six 2640-hp. Francis turbines, direct connected to three-phase generators running at 315 rev. per min. and delivering current at from 4000 to 4800 volts. In Venice the pressure is reduced from 36,000 first to 6000 volts, at which pressure the current is fed to substations, where the voltage is further reduced for distribution.

Metal Market.

NEW YORK, December 12, 1906.

Pig Tin.—The market has been moderately active within a narrow range of prices, which were on a somewhat higher level than those prevailing a week ago. The highest price of the week, 43c., was made Friday. Sales were made Monday and Tuesday at 42.85c., and Tin can be had to-day at the same price. Taking into consideration the almost universal habit of allowing stocks to decline during December, in preparation for stock taking, the amount of business now prevailing is considered satisfactory. There has been a little inquiry for Tin for later deliveries, but the prices offered have been too low to result in any business. There is no longer any anxiety regarding a scarcity of metal in this country during December, as 1415 tons have already arrived and of the 3150 tons afloat 1840 tons will make this month's delivery. The London market is higher to-day, closing at £196 10s. for spot and £196 for futures.

Copper.—In the scramble after spot and nearby deliveries prices have advanced rapidly, and little differences of ⅛c. or ¼c. per lb. between buyers and sellers are quickly adjusted. Lake is quoted at 23c. to 23.25c., Electrolytic at 22.75c. to 23.25c., and Casting grades at 22.50c. to 23c. Sellers of cask lots, and there is little metal to be had for this month's delivery except in these small lots, have no difficulty in securing 24c. for Lake and 23.50c. for Electrolytic. We learn of firm bids of 23.12½c. for considerable quantities of Electrolytic for January, February and March deliveries, with no takers. The United Metal Sellings Company is disposing of only limited quantities for April shipment. Export houses are willing to pay higher prices than American consumers, but are only able to secure small lots. The strength of the foreign market is well illustrated by a £3 advance during the week, spot closing in London at £106, futures at £106 15s. and Best Selected at £110. The price of Best Selected is equivalent to 22.75c. The exports so far this month are small, amounting to but 4105 tons, but European melters are securing considerable metal from Japan, production in that country having increased rapidly.

Pig Lead.—Contract Lead is coming in more freely, but the price of spot is much firmer, it having developed additional strength this afternoon. There is none to be had at less than 6.12½c., New York, and 5.92½c., St. Louis. The demand is excellent, and in some quarters an advance by the American Smelting & Refining Company is not considered improbable.

Spelter.—Prices are again higher in response to a greatly increased demand. Some producers have sold all their production as far away as February and March. Carload lots of Prime Western are quoted at 6.65c., New York, and 6.50c., St. Louis.

Quicksilver.—Flasks of 75 lb. in 100-flask lots are held at $41 per flask. Jobbing lots can be had at $42.

Aluminum.—Deliveries continue much belated, but the price is unchanged, at 36c. for No. 1 Ingots and 34c. for No. 2.

Nickel.—Large lots are quoted at 45c.; smaller quantities at 55c. to 65c.

Antimony.—Quotations have been marked up again in Europe, and Hallett's is now quoted at £115 and Ordinary Brands at £114. In this country, Cookson's is selling at 26c., Hallett's at 25c. and other brands at 24.50c. to 25c.

Ferroalloys.—While the demand is good, consumers are not willing to commit themselves to taking large amounts at the present prices. Ferrosilicon is unchanged, at $104 to $106. Ferromanganese can still be had at $78 and Ferrochrome on the basis of $150.

Tin Plate.—A further advance in price may be made this month, but at present the base price is unchanged at $4.09, f.o.b. New York, and 3.90, f.o.b. Pittsburgh, subject to the usual trade discount. Prices have advanced 1½d. in Swansea to 15s. 1½d.

Old Metals.—Prices are firmer in almost all lines. Dealers' selling prices are as follows:

	Cents.
Copper, Heavy Cut and Crucible	21.50 to 22.00
Copper, Heavy and Wire	21.00 to 21.50
Copper, Light and Bottoms	19.00 to 19.50
Brass, Heavy	15.25 to 15.75
Brass, Light	12.25 to 12.75
Heavy Machine Composition	19.25 to 19.75
Clean Brass Turnings	14.00 to 14.50
Composition Turnings	17.00 to 17.75
Lead, Heavy	5.90
Tea Lead	5.60
Zinc Scrap	5.00

At the pig iron storage yards of Connal & Co., Middlesbrough, England, a steam cantilever crane is employed for lifting and piling pig iron by means of magnets. The maximum radius is 60 ft. and the minimum radius 8 ft. The crane has a lifting capacity of 2½ tons at the full radius and of 3 tons at a radius of 50 ft. All the movements of lifting, racking, revolving, traveling and cross traveling are performed by one pair of engines.

Tariff Opinion in Canada.

TORONTO, December 8, 1906.—In the past week the new tariff received more attention from the manufacturers than from the legislators. The latter's work upon the measure was confined to the reporting by the House in Committee of the Whole of the first five sections of the first resolutions. This included the approving of the British preference and of the intermediate tariff. This middle scale of duties, being the innovation of the bill, was the subject of nearly all the discussion that took place. The Finance Minister was pressed to state the general conditions upon which the intermediate schedules would be extended to foreign nations. In the resolution no condition is prescribed, save that goods for which entry is claimed under that tariff must be the product of the country enjoying its benefits. Authority is given to the Governor in Council to open the intermediate tariff, in whole or in part, to any country, the order in Council so extending the privilege requiring no subsequent ratification by Parliament. In fact, if the tariff resolutions are finally adopted in their present form the Government can select any nation or nations it pleases for the favor of the second column duties. It is empowered "from time to time, in consideration of benefits satisfactory to the Governor in Council, to extend the benefit of the intermediate tariff." To this blank draft of political power the Opposition was not prepared to subscribe. Both the leader, Mr. Borden, and Mr. Foster, the financial critic on that side of the House, strongly protested against any such latitude of discretion being given to the Government. Of course, such discretion would be limited to nontreaty action. If the Canadian Government chose to declare the intermediate tariff to be in effect for imports coming from the United States nothing more would be necessary, unless that action and correlative action by the United States Government were the result of a formal convention.

In spite of the efforts of the Opposition to bring the Government to some definite statement of the particular objects contemplated by the intermediate tariff, the ministers maintained their reserve. In view of possible negotiations they declined to commit themselves on the subject, more than to say that the Government would concede the intermediate tariff whenever it was found advantageous to Canada to do so, and in return for special favors. Mr. Fielding assured the Opposition that no matter to what country the intermediate tariff might be opened it would not bring into operation favored nation rights for the United States or Germany, as neither of these countries had claims upon Canada for such rights, nor, he added, was the fear much more reasonable that the intermediate tariff would be conceded to the United States by negotiation.

The Manufacturers' Association.

The following resolution was passed by the Tariff Committee of the Toronto branch of the Canadian Manufacturers' Association and handed out for publication:

Generally speaking, the new tariff is a disappointment. The general tariff is practically the same as the old tariff, and will not encourage the establishment of new industries. The recommendations made by the different manufacturers regarding their individual lines of industry have seemingly been disregarded.

The general tariff is little or no improvement as a protection against the United States, while, on the other hand, the intermediate tariff, if it is made applicable to the United States, would be disastrous to many industries. The various manufacturing sections of the association have now under consideration the specific items.

W. K. George, chairman of the Tariff Committee and past president of the whole association, says the protest in the above resolution is based on the two following propositions:

1. Our appeal for a changing and altering of the present tariff was based on the idea that it should be so drawn up as to force new industries from the United States and other foreign countries to come to Canada, to manufacture their goods here, and to do their export trade with the British Empire from Canadian soil.

2. Although the country is at present prosperous, every business man knows that times of change arrive. The new tariff is based on a theory of continuous and increasing prosperity. In it there is no anticipation of, or preparation for, "hard times," or, at least, less prosperous times, when competition will be keener and the struggle for existence among Canadian manufacturers more serious.

Pig Iron.

A deputation waited on Mr. Fielding on Tuesday to protest against the drawback of 95 per cent. of the duty on pig iron used in harvest machinery for the home market. Present in the deputation were R. Hobson and D. O'Connor of the Hamilton Blast Furnace Company, George E. Drummond of the Canada Iron Furnace Company, Mr. Kinghorn of the Montreal Rolling Mills, and Mr. Irving of the Nova Scotia Steel & Coal Company. It was pointed out that the drawback in favor of harvest machinery is inconsistent with the Government's bounties, the former operating to curtail the business of Canadian manufacturers of pig iron, rolled iron and rolled steel, which business the latter was designed to promote. One member of the deputation expressed himself publicly on the question as follows:

This is the worst blunder which the new tariff contains. It means that anywhere from 15 to 20 per cent. of the iron and steel products of Canada will be displaced by United States or British iron and steel. You will notice that the general tariff upon harvesters is reduced from 20 to 17½ per cent. This is done to make the Canadian agriculturist happy, and then to keep the friends of the Government who are making agricultural implements in a pleasant frame of mind they are allowed this drawback, with the result that the iron and steel men are seriously hurt, and one of the greatest anomalies in the new tariff is the result. Let me mention that we have it on the best authority that since last Thursday scores of orders placed with Canadian iron and steel manufacturers by implement makers have been canceled.

Rolling Mill Interests.

A deputation representing the rolling mill interests of Canada had a long interview with the Minister of Finance, when they protested against the new duty of $2.75 a ton on steel billets, slabs, puddled bars, &c. They pointed out that under the old tariff the duty on bars was $7, which with one-third off came to $4.67. The duty on billets was $2, which left a margin of $2.67 per 2000 lb. for rolling. Under the new tariff the duty on bars under the British preference is $4.25, and the duty on billets $2.75, thus reducing the margin for rolling to $1.50 per 2000 lb. In other words, from the previous margin of $2.67 per ton the Government had taken off $1.17 per ton, or equal to 43 4-5 per cent. The Canadian rolling mills have to get their billets from continental makers, and Great Britain to some extent does the same. It was requested that the duty on steel billets should be, as before, $2 under the general tariff and $1.35 under the British preference. In respect to other materials, such as rolled iron and steel angles, bar iron or steel rolled, rolled iron or steel sheets, iron and steel railroad bars and rails, and fish plates and iron plates, they asked to be placed relatively in the same position as before.

The rolling mill interests represented were of course those not producing their own raw material. They referred to the impossibility of getting an adequate supply from Canadian manufacturers of puddled bar and crude steel. Under the old tariff arrangement the margin of the rolling mills was, they showed, $2.67 per ton, whereas under the new it is but $1.50 per ton.

Tin Plate.

Representatives of the company that is establishing tin plate works at Morrisburg interviewed the Ministers to make a final plea for a duty on their product and to protest against the duty being increased on billets.

Hardware.

At its annual meeting, the Montreal Metal and Hardware Association discussed the tariff changes, and decided to co-operate with the Wholesale Dry Goods Association to send a deputation to Ottawa to urge the removal of the duty on packages. The following officers were elected: President, George A. Kohl; vice-president, T. L. Paton; treasurer, J. H. Hanson. Directors, A. A. Brown, H. W. Dorken, H. J. Fuller and J. R. Kinghorn.

A point in respect to which there is perplexity is as to the treatment of packing cases in which there are now dutiable goods. Galvanized iron, when coming from Great Britain, has free entry. As British shippers always charge for cases, which is the contrary to the general American practice, it is probable that the package in

which the now dutiable British article is contained will be dutiable.

Expected a Ship Bounty.

"Without criticising the tariff in general, I regret particularly that no provision was made for giving fair consideration to the shipbuilding interests of Canada," said Frederick Nicholls, managing director of the Canadian General Electric Company. "The disabilities of the industry have been fully explained to the Finance Minister from time to time, and all connected with it thought it would receive favorable consideration at his hands. The reason for this consideration being asked is that there is no other such anomaly existing throughout the entire Canadian tariff. Those of us who are manufacturing ships have to pay duty on nearly all the material that enters into that manufacture. On the other hand, if a ship is imported from Great Britain, with furnishings complete, it is allowed to enter Canada absolutely free of duty."

T. B. Polson, manager of the Polson Company, Toronto, said:

We are very much disappointed that no bounty on shipbuilding was announced. We were expecting one, so as to enable us to compete with the British shipyards. During the last three years there must have been a dozen boats brought in here from England, which cost over $100,000 each. If we had a Government bounty we feel that we could keep that business here.

Steel and Coal Companies Reconcile.

In his budget speech the Finance Minister adverted to the controversy between the Dominion Iron & Steel Company and the Dominion Coal Company, at that time in a state of truce, not of settlement. He said:

Both of these corporations owe something to the Parliament and public of Canada, and that being the case I feel that I shall but speak the wish of the Government and of this Parliament when I say that we expect the gentlemen connected with these great enterprises to make every possible, every reasonable effort, and that speedily, to bring about an adjustment of the difficulty, the continuance of which would bring serious disturbance to the business of a large portion of our country.

Efforts to come to terms were immediately resumed, and the Finance Minister spent a day and a night in Montreal to assist the parties to an understanding. The upshot of the negotiations was announced at the end of the week. The Steel Company is to receive the class of coal it has insisted on getting, but it is to pay a higher price. This arrangement is to hold for two years. In the meantime the friendly suit will be tried for the determining of the Steel Company's rights under the original contract. Credit for bringing the parties into harmony is given to Mr. Fielding. It has been suggested that the extending of the iron and steel bounties for another four-year period had some influence to make the new arrangement less unsatisfactory to the Steel Company.

C. A. C. J.

The differences between the Reading Iron Company and its large force of puddlers, resulting in the stoppage of its mills at Reading, Pa., since July 1, were amicably settled December 6. The puddlers had been getting $4 per ton for puddling up to July 1, when they demanded $4.50 per ton. They paid their own helpers. When the Reading Iron Company made its recent general advance of wages in all departments, including the puddle mills, it named a rate of $2.87 a ton for puddlers and $1.72 per ton for hedpers, making the total cost to the company $4.59 per ton for puddling. The men, however, were unaccustomed to being paid in this way and preferred the old method. It was finally agreed to pay the puddlers $2.87 per ton and the helpers 42 cents a heat. There are four heats to the ton, which practically makes the basis of puddling $4.55 per ton, or 5 cents per ton more than the men asked and 4 cents less than the company offered in the recent general advance. It is understood that the mills will be started up as fast as they can be prepared for use.

A strike was called at the General Electric Company's Schenectady, N. Y., works, December 10, by the Industrial Workers of the World, a rival of the American Federation of Labor. Three members of this union were discharged and their reinstatement was demanded. The company states that about 2000 men are out.

The Canadian Bessemer Ore Company.

The explorations which have been carried on in the district east of Port Arthur, Ont., close to the north shore of Lake Superior in the past three months have brought to light a body of ore that is attracting the attention of a number of interests. The early reports of the discovery were received with some skepticism, in view of the fact that considerable drill work had been done just to the north of the scene of recent operations, and, while the familiar taconite and greenstone of the Mesaba formation were found, there were only scant ore showings, and these were not of a character to warrant following up.

Among those interested in what it is expected will soon be a shipping district is W. H. Hassinger, formerly district manager of the Republic Iron & Steel Company, Birmingham, Ala. Mr. Hassinger is quoted to the effect that a deposit of high grade hematite ore has been found, containing 200,000,000 tons, all within 25 miles of Port Arthur and much of it within a few miles of Thunder Bay. Between 60 and 70 test pits have been put down, most of them on the east and west ends of the formation, which has been traced for a distance of 5 miles. The formation is taken to be of the Animikie series and a continuation of the Mesaba range. Previous exploration, carried on in the vicinity of Loon Lake, came almost to the northern edge of the present find.

The ore is found within 2 or 3 ft. of the surface and the test pits thus far put down have shown it to be continuous to a depth of 35 ft. In the top 4 or 5 ft. of the deposit the ore is streaked with lime. Farther down clean ore is found, running high in iron and low in phosphorus. Unlike the Mesaba ore or most of that of the Vermillion range the new deposit is a hard hematite, giving evidence of great compressive action in connection with the glacial movement. For the most part the samples taken are red ore, but in the central portions of the formation a hard, blue hematite is found. Numerous samplings and analyses have shown that for the top 5 ft. of the deposit, which is like the Mesaba in being a blanket formation, the ore runs from 34 to 47 per cent. in metallic iron and from 0.007 to 0.051 in phosphorus, with 2 to 3 per cent. lime. A second group of samples taken from 5 to 35 ft. in depth ran generally above 60 per cent. in iron, some as high as 68 and 69 per cent., with phosphorus about 0.025. The pits in hard blue hematite near the lake shore, in the central section of the deposit, produced samples of which the analyses of 13 ranged from 59.08 to 65.70 in iron, 3.85 to 14.50 in silica, with phosphorus generally below 0.02. Some of the samples showed appreciable sulphur, but in most cases only a trace. The average metallic iron from samples taken from 5 to 35 ft. in depth was 63.05 per cent. Of the hard blue ore samples the average metallic iron was 61.9 per cent. In but a few cases was a trace of titanium shown.

Those interested in the new find are organizing the Canadian Bessemer Ore Company, and it is announced that the intention is to develop the property and to ship ore. Much of the ore is said to be within a few miles of Thunder Bay, and the harbor at the head of the bay is sufficiently well sheltered behind an island to make an excellent location for docks. It is stated that 11,000 acres of iron bearing land have been taken up by those interested in the new company, and early mining can be conducted so close to the lake that the ore will be run to the docks by gravity. Steam shovels can be used for mining, after a preliminary shaking up of the ore with explosives.

A new method of treating wooden ties and joists to prevent rot consists essentially in saturating the wood with some salt, such as sulphate of copper, which is then electrically decomposed, thus setting free copper all through the pores of the wood. This not only tends to protect the wood itself, but by closing up the pores retains within them a certain amount of the copper sulphate, the preservative agent. The sulphate solution is forced into the pores of the wood by pressure exerted within the bath where the electrolyte is first applied.

The Machinery Trade.

NEW YORK, December 12, 1906.

The demand for machine tools has slackened up to some extent, which is only natural at this time of the year. The decrease in business, however, is only slight and does not indicate any change in general condition, which appears to be as sound as ever. The buying of the past week was done chiefly by industrial companies, the railroads having done but very little. This is not surprising, in view of the approach of the new year, as the railroads are busy preparing their programmes for machine tool purchases next year, several of which are already under way. In some branches of the trade an advance in prices is being agitated, and prices on air compressors and pneumatic machinery are stiffening. On these last mentioned machines price-lists have not been changed, though raw material has advanced considerably. It will not be surprising, in view of the increases made on practically all lines of machine tools, to hear of prices on compressors, pneumatic drills, hammers, &c., being advanced at an early date.

Machinery men whose interests are closely identified with the railroads are watching a number of the large carrying companies in expectation of machinery requirements for the new year. It seems to be the general prediction that the railroads will be unusually large buyers as many extensions are being made and others have been arranged for, especially in the South, where industries are growing rapidly and are demanding greater facilities. A machinery man who returned this week from that section declares that the requirements from the Southern railroads for next year will be unusually heavy both for construction material and shop equipment. The scarcity of freight cars has prompted many roads to make arrangements for building more of their own cars and much is being done toward preparing to make repairs on rolling stock. The introduction of the steel freight car on many roads has made necessary the purchase of equipment for doing repairs on that kind of rolling stock. Very shortly the trade will no doubt hear from the South in that line.

It has been decided to hold the joint conventions of the National Supply and Machinery Dealers' Association, the Southern Supply and Machinery Dealers' Association and the American Supply and Machinery Manufacturers' Association at Cincinnati, Ohio, on May 8, 9 and 10, next. The session will be the first of the kind ever held by the three organizations, and it is expected that each association will have a larger gathering than it has ever mustered before.

Plan to Concentrate Machinery Interests.

At a meeting of representatives of prominent metal and machinery houses held on Thursday afternoon, December 6, in the board room of the Board of Trade and Transportation, 203 Broadway, New York, a movement was started to get representative firms in the trade to colonize their offices in the proposed buildings of the Hudson Companies being constructed on Church street, between Cortlandt and Fulton streets, as a terminal station for the tunnels under the Hudson River. At the same time a plan was broached to form a machinery club with dining rooms and headquarters in the terminal building, and it was pointed out that it would be feasible to establish a warehouse for storage and show room purposes on the Jersey side of the river within easy reach of the terminal building. The meeting, which was called by F. H. Stillman, president of the Watson-Stillman Company, and which was presided over by him, resulted in the passing of a motion to the effect that Mr. Stillman be delegated to select a committee of plan and scope to make a canvass of the trade to get the general sentiment on the proposition and arrange for future meetings. Mr. Stillman, after being selected as chairman, expressed his interest in the movement by stating that his firm had found by locating down town in the machinery district that there were many advantages to all concerned in concentration of the trade interests. He said that he had been informed that the Hudson Companies would be glad to reserve a space in the Fulton Building of its terminal for the trade, provided assurance was given that a fair number of firms would locate there. Mr. Stillman pointed out the fact that among other advantages it would be a convenient arrangement for those having business with the trade by affording a chance to make numerous visits in one building. He explained that the building of the terminal would result in the turning of numerous machinery firms, now located in the machinery district, out of their present quarters, and declared that the construction of the tunnel building offered the best possible advantage for the concentration of the machinery interests. Continuing, the speaker explained the advantages of a warehouse on the other side of the river, which he said could be built to accommodate the exhibits and stock of a large number of firms. It could be located, he said, on the water front on the Jersey side and could be reached from the terminal building within ten minutes. Continuing, Mr. Stillman pointed out that an organization could be formed in the trade similar to that maintained by men in other lines of business, and he expressed himself as being confident that the trade would welcome a club at which the members might meet to dine and for social intercourse. In conclusion, he introduced Kenyon B. Conger, of the Hudson Companies, who said that his company would be glad to accommodate the trade in the building on the Fulton street side of the terminal. He declared that some of the largest corporations in the country are making arrangements to occupy entire floors in the Cortlandt Building and over half of the space on that side has been contracted for. He added that it would be necessary to have an early opinion as to whether the machinery interests would take up a fair amount of space in the building, which, in his opinion, offered special facilities for the trade. He called attention to the fact that it was the first opportunity offered in New York for the concentration of machinery interests under one roof, and followed with a description of the advantages offered by the building.

"We have," said Mr. Conger, "reserved the entire twenty-second floor of the Fulton Building should it be found advisable to organize such a club among the trade. On the ground floor there will be a bank, and arrangements are being made for safe deposit vaults which may be utilized by the tenants. Aside from its office accommodation, many entire floors have been arranged for by some of the largest manufacturing concerns more or less identified with the Hudson & Manhattan Railroad. These interests are heavy users of machinery. I now come to what I believe is one of the most important features to be seriously taken up by the machinery trade. Most of you are acquainted with the plan for having a special machinery warehouse in Jersey City along the lines of the railroad running through the McAdoo tunnels. This, it seems to me, if worked in conjunction with the terminal station, should provide a practical solution of the problem which now confronts the machinery trade of New York. You are aware how absolutely uneconomical it is to attempt to use a showroom in lower New York to-day. It simply means the handling of very heavy freight from cars or boats to the showroom, and recarting it back to the river front or freight station later on. If, on the other hand, the machinery trade could concentrate its various offices in the terminal buildings, and at the same time have its showrooms in an especially constructed warehouse in Jersey City, the problem would be solved. The difference in the cost of real estate in lower New York and Jersey City would make this plan a very economical one, and the ease with which the various tenants could travel between the terminal buildings and the showrooms in Jersey City would make the plan entirely feasible. In point of time the two buildings would not be 10 minutes apart."

After Mr. Conger's address the chairman asked for an expression of opinion from the gathering, and a number gave their approval of the project. H. F. Frevert of the Frevert Machinery Company said that he thought that the plan was a good one all through, and was in hearty approval of it in every detail. Following, Mr. Hungerford of the Morris Machine Works expressed himself as being willing to help the scheme in any way possible, and concluded by offering a motion that Mr. Stillman be authorized to appoint a committee, at his leisure, to outline a general plan for forwarding the movement, which was passed. The meeting was adjourned with the understanding that at an early date another session will be held, at which subcommittees will probably be appointed to conclude the work of organization and make the general arrangements.

American Locomotive Company Buying.

The American Locomotive Company is making purchases for the improvements now under way at Richmond, Va., and the company is spending about $500,000 for its buildings and equipment. It is understood that the plans have so far progressed that the interior arrangements have been determined on, and that cranes and other conveying apparatus are now being selected. Inquiries are also out, it is understood, for some heavy equipment in the machine tool line, and orders are to be placed as rapidly as practical. The extensions to the Richmond locomotive works are being made in order to increase the company's output of steam shovels. There is at present a steam shovel department attached to the Richmond plant, but it is not a particularly large one, and the demand from the South has been so great of late that the additions have become imperative. The additions will include a main building, 172 x 450 ft., and it will be in three bays. The two outside bays will be 49 ft. wide and 32 ft. high, running the full length of the building, and the center bay will be 72 ft. wide and 48 ft. high. The latter portion of the structure will be used for assembling the steam shovels, and the outside bay will be equipped with tools for turning out the parts. The equipment, it is understood, includes two cranes of 10 tons capacity, each with 66 ft. span, to serve the bays, and there will be some larger equipment of that kind for the center bay. The plans for Richmond include the erection of a new power house, with

a capacity for about 3000 hp., and a producer gas plant of a large size. Considerable coal handling machinery is to be added to the Richmond equipment, and there will be a new erecting shop.

It is said in the trade that a list is being prepared by the Baltimore & Ohio Railroad for its 1907 requirements, and it is expected that very shortly machinery men will hear from that company. The list now in preparation, it is declared, covers requirements for a number of the company's shops, and it includes considerable in the way of machine tool equipment. It will be remembered that the road issued a large list early last year, and purchased against it several times during the spring and summer. It is not thought, however, that the requirements for last year were entirely filled, and it is said that the machinery on that list which was not purchased will be bought early this year together with additional requirements called for by the company's mechanical force.

The Erie Railroad has put out a number of inquiries lately supplementing the rather extensive list sent to the trade some time ago, and incidentally the company has been closing some orders on the original list. The supplementary list was not a large one, and the requirements, it is thought, are for the Harrisburg shops.

Inquiries for a small lot of machine tools have been sent out by W. Y. Cruikshank, receiver of the Salmon Iron Company, Freeland, Pa., to complete the equipment of the plant for doing a large range of general foundry and machine work. The list of machines on which bids are desired covers one 40-in. engine lathe at least 18 ft. between centers, one 72-in. vertical boring mill, one 26-in. radial drill, one 8 or 10 in. slotter and one screw cutter ½ to 2 in. capacity. The plant, which has been closed for the past two years, has been put in operation under very favorable circumstances by the receiver. The plant is to be equipped with new machinery to purchase which $8000 has been set aside. To start the works on a proper basis $18,000 was raised, $10,000 of which will be used to carry on the business.

Drills, bolt cutters, shapers, riveters, lathes, shafting, pulleys, belting, &c., are required by the Gilson Mfg. Company, Port Washington, Wis., for equipping its new factory at Guelph, Ont., which it is erecting for the manufacture of gasoline engines, agricultural machinery and chair irons.

The Standard Fitting & Valve Company, Guelph, Ont., which was recently incorporated with a capital stock of $100,000, has purchased a site for $5000, on which it will erect a plant for the manufacture of plumbers' supplies and wrought iron pipe. The company will spend $30,000 in the erection of buildings, and will install machinery at a cost of $75,000. Information can be obtained from John M. Taylor, treasurer of the company, who is president and general manager of the Taylor-Forbes Company. Several of those interested in the Aird-Don Company, Troy, N. Y., are also interested in the new company.

The result of the bidding on a list of machine tools required by the Board of Education for the Stuyvesant High School is of especial interest to the trade, indicating as it does the trend of the machinery market. The bids were opened last week, and it was found that there was only one company which put in prices on each machine listed, and it was decided to award the contract to that company. There were about 20 bidders in all, and their estimates were scattered through the list of requirements, and when tabulated it was found that it would not be practicable to accept many of the orders because of the length of time demanded to complete the order. A number of prominent machinery houses who were asked to put in bids did not do so because, it is assumed, of the rush of present business. The Howe Engineering Company, 150 Nassau street, New York, put in a bid which covered the entire list. Its total estimate amounted to $69,800, and after due deliberation the board decided to award that company the contract. The fact that many of the largest machine tool builders, and especially the big interests which control several lines of machinery, did not take the trouble to put in bids is worth commenting on, and it was noted that all of the prices submitted were in advance of those paid for similar equipment within the last year. In several lines the Howe Engineering Company was the only bidder, and it was known that some that put in bids on certain machines did not offer prices on others which they make, which can be taken as an indication that they have about all they can do on some lines and are not prepared to seek orders. The Howe Engineering Company will purchase the machinery it has agreed to furnish under the contract, and it is understood that the company has prices on most of the machines. As the machinery will have to be delivered within 90 days, what buying is to be done will no doubt be promptly arranged.

The business, patents, drawings, machines, &c., of the Falkinau-Sinclair Machine Company and the Philadelphia Machine & Tool Company, Philadelphia, Pa., which were consolidated several years ago, have been purchased by Kane & Roach, Syracuse, N. Y., who have moved them to their plant, where they will continue the business in connection with their own line of machinery. The machinery purchased covers all sizes and styles of die presses, punch presses, double crank presses, drawing presses, hand screw presses, embossing presses, cornice presses, square shears, rotary shears, belt straightening rolls for sheet metal, steam drop presses, spinning lathes and everything pertaining to the line of sheet metal machinery, besides a variety of special machines. Kane & Roach intend to improve these machines and make them among the best on the market. They will be built in connection with their present line of carriage and wagon machinery and rolling mill machinery, of which they build over 150 different kinds. Last spring they bought out the Syracuse Rawhide Company, which they are now running. At present the firm is building what is said to be the largest roll straightening machine ever constructed, which will weigh over 60 tons, for straightening all sizes of angles up to 10 x 10 x 1¼ in., and all sizes of I beams and channels up to 24 in. wide. This machine will be shipped about the last of December.

Routes for seven new subways have been approved by the Board of Estimate, and the Rapid Transit Commission has been authorized to advertise for alternate bids, first for construction, and second for construction and operation. The routes for which proposals will be asked are the Seventh avenue, Eighth avenue, Lexington avenue, Third avenue, Jerome avenue, Fourth avenue and Bensonhurst in Brooklyn, the triborough route including Third avenue, Manhattan Bridge and part of the Brooklyn route and the West Farms and White Plains route. The action of the Board of Estimate at this time undoubtedly means the beginning of construction work in the early part of next year, which will be of considerably interest to the machinery trade. For constructing the present subway a large amount of mechanical equipment was required, and the contractors who undertake the new work wil undoubtedly have to purchase a great deal of machinery.

Bids will be received at the office of the Department of Water Supply, Gas and Electricity, Park Row Building, New York, on Wednesday, December 26, for eight water tube boilers, to be installed in the remodeled Ridgewood pumping station at Atlantic avenue, near Logan street, in the Borough of Brooklyn. The security required with bids is $20,000, and 350 days will be allowed for completing the work.

The Empire Foundry Company, Syracuse, N. Y., is getting bids on one 15-hp. electric motor and one 7½-hp. electric motor. It is understood that the business will be closed very shortly.

Inquiries are being made in the market for a 200-hp. engine, to be installed in a factory in course of construction at Long Island City owned by G. Sandlbohm. J. H. Baker of 85 Borden avenue, Long Island City, is the architect for the structure which is to be a four-story brick factory, 100 x 100 ft., and is being built for renting purposes.

The village of Hoosic Falls, N. Y., is investigating the cost of a municipal water system, and it is understood that very shortly bids will be asked on a 1400-gal. per minute pumping engine, as inquiries in that line have been received from several sources.

Dayton Fisher having withdrawn from the firm of Fisher & Stevens, the business will be carried on under the same name by C. F. Stevens. The firm deals in railroad, contractors' factory and mill supplies, and is located at 18 Dey street, New York.

Philadelphia Machinery Market.

PHILADELPHIA, PA., December 11, 1906.

The market has been rather inactive the past week. The year's end dullness seems to be more effective this year than in December, 1905. Practically all of the business closed has been in single tools. A few sales of small lots are to be noted, but in these instances the aggregate price did not equal as much as the price for some of the single tools sold. Inquiries keep up remarkably well, but dealers and manufacturers note the slowness with which present day inquiries develop into actual orders, and no doubt a considerable quantity of those being received are simply for the purpose of keeping in touch with prices and delivery dates, with a view of buying during the early months of the coming year.

Some little railroad business is floating around, and a few orders for tools have developed from these sources. No specifications, however, for any general equipment for 1907 are heard of at this time, and it is questioned in some sources whether any large supply of tools will be required by the local roads, particularly during the first half. While manufacturers are not booking many new orders, sufficient business is being received to keep order books pretty well filled. The present lull should help some on future deliveries, but there will have to be quite a long period of inactivity to make deliveries on present orders any better. Plants, as a rule, are being operated at full capacity and have a large volume of business ahead. The foreign demand for machinery and tools is rather light in this territory. Some inquiry for special tools is to be noted, and several orders have been booked. The demand for boilers

and engines continues fair. There has been some good inquiry for second-hand boilers and engines of medium powers, but the demand on the whole is not as active as the trade would like. Dealers in second-hand machine tools experience a very active demand, but desirable tools are rather scarce, and in some lines and sizes almost impossible to obtain. Inquiries for the standard lines of tools are very large, and dealers are making every effort to meet the demand, as well as to keep stocks of tools on hand.

The foundry trades continue active in every branch of the business. Contracts have in many cases been closed by both steel and iron foundries for large tonnages of castings for delivery during 1907, while it is almost impossible to take any extended business for early delivery. The delay in obtaining prompt deliveries on machinery castings is an important factor to the builders of machine tools, and frequent complaint is heard of the difficulty in obtaining deliveries desired.

The Bureau of Filtration, Department of Public Works, of the city of Philadelphia, is asking for bids on what is known as contract No. 93 for pumping engines for the Lardner's Point Pumping Station, Pump House No. 3. The principal data in connection with this proposal are as follows:

Four engines, either (*a*) vertical triple expansion condensing engines with three steam cylinders and three single acting plungers and three water cylinders, or (*b*) vertical triple expansion condensing engines, with six steam cylinders, in pairs of three and either two or four water cylinders. Either may be crank and flywheel or direct acting with compensating devices. The rated speed being 20 rev. per min., the rated capacity being 20,000,000 gal. per 24 hr., with an overload capacity of 25,000,000 gal. per day of 24 hr., the total pumping head being (not including friction in pump or suction line) 220 ft., while the steam pressure at the throttle is to be 180 lb. per square inch. Bids will be opened January 4, 1907, at 12 o'clock noon, and the following factors will be considered: First, reliability as evidenced by the design and experience; second, first cost; third, operating cost; fourth, time of delivery.

The same Department is also asking for proposals for coal handling machinery and coal pockets for the Torresdale Pumping Station, Delaware avenue and Pennypack street. This includes the construction and starting of a complete system of machinery to handle bituminous coal from barges in the Delaware River and from railroad cars on a spur track to coal hoppers over boilers or to the boiler room floor. The system will include a timber wharf on the Delaware River, a hoisting tower on this wharf for unloading coal from barges or boats moored alongside, a steel hopper for receiving coal, transporting or conveying machinery for delivering the coal from the hopper to a storage bin; a concrete coal storage bin on timber piles, a railroad, cars and an electric locomotive for delivering coal from the storage bin to a hopper; also to the boiler room floor for hand firing, a steel and concrete coal and ash tower equipped with elevating machinery, delivering to two concrete bins at different elevations, screens and crushers, a steel bridge to connect the coal tower to the boiler house, a railroad, and hand propelled cars running over bridge and boilers, eight steel pockets over boilers, a railroad and cars running through tunnel under boilers to the ash hopper, a standard gauge railroad track to connect the present track with the coal and ash tower. Bids will be received by the Director of Public Works, City Hall, Philadelphia, until noon January 4, 1907. Plans and specifications may be had on application from C. E. Gillette, Chief Engineer, Department of Filtration, Room 712, City Hall.

The Keystone Mineral Wool Company, Bridgeport, Pa., will increase the capacity of its plant, and is in the market for a 100 or 150 hp. boiler. One of the locomotive type is more particularly suited for its purpose.

The Nicetown Plate Washer Company of this city is in the market for a 16 or 18 in. roll lathe. It will shortly increase the capacity of its mill to 40 tons daily, rolling flat, square and round iron. The major portion of the necessary additional equipment has already been purchased.

The plant of the late Searchmont Automobile Works at Trainer Station, near Chester, Pa., has been purchased by N. Z. Graves & Co., Philadelphia, Pa., large manufacturers of paints and varnishes. This firm operates a number of plants in and about the city, one of which will be removed to the new location and its capacity increased six-fold. It is understood that additional machinery for paint manufacture will be required, but it is not known at the time whether any additional tool equipment will be required.

The Eynon-Evans Mfg. Company has moved its offices to the southwest corner of Sydenham and Clearfield streets, opposite its plant, and will devote the space formerly occupied by its office and drawing rooms to additional machine shop and tool room space, for the further equipment of which the company is in the market for a number of turret lathes. It has also decided to engage in the manufacture of light gray iron castings, of which it uses a large tonnage, and is now looking for a plant having a capacity of 10 to 15 tons a day, with a view of purchasing, the location of which it is preferred, should be adjacent to this city.

The American Pulley Company is busy in every department. A good demand for its product continues, both from the domestic as well as foreign trade, although there is a slight diminution in the number of orders placed, which is said to be a normal condition at the year's end. A large shipment, comprising a carload of pulleys of various sizes, has recently been made to London, while shipments of similar size to a number of domestic points in the South and West have also been made.

The Hess Machine Works notes an increased demand from both foreign and domestic sources for file making machinery, and orders have recently been booked for eight machines for export to England and for four machines for export to Russia. The domestic demand comes largely from the Middle West, although orders have also been booked from local concerns. The company is busy in every department, and reports the recent shipment of five sets of file making machinery for export to Switzerland and one set for export to Germany. A lot of 10 sets of machines has also been shipped recently to a customer in the Middle West.

New England Machinery Market

WORCESTER, MASS., December 11, 1906.

A few changes in prices have been noted during the week, in every instance an increase. One of the larger planer builders has advanced its entire line. Other advances have been rather desultory, a machine here and there, usually picked out of a line for some exceptional reason. The business of the dealers continues as good as ever, no complaint being heard excepting on deliveries, which are causing the dealers no end of trouble.

In Providence, where the dealers carry in addition to the usual line machinery used in jewelry manufacturing, of which the city is a center, there is slight falling off from this partirular branch of the trade. The jewelry people have been large buyers of recent months, and judging from contemplated additions to their factories and proposals to establish new industries of this class next season should also be a good one. The dealers find general business exceedingly good, though hampered in common with every one else with deliveries.

One of the large milling machine companies has issued a new form of stocksheet to its dealers, which is probably the most complete in the information contained of anything of the sort ever adopted. It is in the form of a folio, tabulated in typewriting. On the inner face of the outside sheet are pasted in large letters the printed names of the months which are covered. On the opposite page is general information to the dealer. Then come the tabulations, in which deliveries are classified by months and by type of machine. Against each machine is its sequence number, from one upwards; its shop order number, dealer's order number, name of dealer or distributor, and the name of the customer. Included is every machine which the works will have for delivery during the months specified. There may be a few machines against which appear the name of no customer, which gives information to the dealer that there is a possibility that he himself can get it. Such a system takes the dealer into the confidence of the manufacturer as to whom he is selling his product and gives very exact information as to the condition of the company's business. The dealers believe this will be of much advantage to them in various ways.

There is much promise for next year's business in the probable large buyers, indicated by more or less authentic report. The plans of the Boston & Maine Railroad for large repair shops at Somerville should be matured in time to begin building in the spring. The General Electric Company promises to make large additions to its several works, with a portion of the money coming from the sale of the new stock which the stockholders recently voted to issue. From Pittsfield, Mass., comes the report that the Stanley-G. I. Electric Mfg. Company's works in that place, one of the three large plants of the General Electric, will be very materially increased in size, rumor doubling their capacity. The Lynn works will undoubtedly be enlarged, the statement being based upon the known congestion which exists in various departments. It is known that other large industries employing machine tools as important parts of their equipment are contemplating large extensions, which will aggregate very large purchases of machinery. The naval stations of New England will require large miscellaneous equipment if the appropriations which the Secretary of the Navy is asking Congress for are granted. It is believed that the great boiler shop at the Portsmouth Navy Yard will be completed, probably to the point of ordering its equipment, which will be a costly one. The appropriation asked for the Charlestown Navy Yard carries with it $76,000 for a new foundry, and probably the Naval Station at Newport, R. I., will come in for its share of new machinery and general equipment. There is no likelihood that the New York, New Haven & Hartford Railroad will go ahead next season in the construction of another great repair shop to take care of its

rolling stock at the western end of its system, a plan which will be carried out some time in the future.

The Agnew Auto-Mailing Machine Company, 156 Pearl street, Boston, has decided to locate new works at Leominster, Mass. It is proposed to erect a factory plant to cost $150,000. A condition of the establishment of the factory at Leominster was the sale of a certain amount of the bonds in that town, and this condition has now been complied with. The agent of the company there states that George L. Richards, who has the matter in hand, has come to a decision. Mr. Richards is about to sail for Europe on business connected with the foreign patent rights to the auto-mailing machine, and upon his return land will be purchased and the new building started. It is stated that 400 hands will be employed. As the company's manufacturing facilities will be greatly enlarged, it will of course be necessary to purchase a large amount of machinery and other equipment. The orders for the auto-mailing machines are far beyond the capacity of the factory at Boston.

The Hopcroft Gas Producer Company, 117 Warner Building, Bridgeport, Conn., has decided to establish its plant in that city. It will manufacture the Hopcroft producer, an English device, which has been in use in that country for over 20 years. The company states that in the short time it has been in business it has been overrun with orders.

The Brown & Sharpe Mfg. Company, Providence, will be occupying its new offices in the near future. The entire upper story of the building, in which the offices are now located on the first floor, will be given over to the purpose, this story having been added with that end in view. The offices will occupy space 50 x 300 ft. with two wings, one 50 x 50 ft., the other 40 x 50 ft. The space is being cut up for its most convenient application to the purposes of the various office departments. The finish while simple is most effective, and there will be every convenience.

The Norwood Engineering Company, Florence, Mass., has awarded contracts for another erecting shop, 18 x 55 ft., and an addition to its foundry, 50 x 105 ft. The company manufactures hydrants, filters, elevators, paper finishing machinery, etc.

The Waterbury Crucible Company, Waterbury, Conn., will erect an addition to its works in the spring, made necessary by the rapid growth of the business, which has increased 300 per cent. over 1905. At least 6000 sq. ft. of new floor space will be provided.

A. F. Stowe, 17 Hermon street, Worcester, who has been manufacturing shoe machinery for many years, has sold out his business to the United Shoe Machinery Company, Beverly, Mass., and will retire. He is disposing of his machinery, of which he has a very complete equipment, including 25 engine lathes, two planers, two milling machines, gear cutting machine, slabbing machine, speed lathes, &c. He has already sold his upright drills.

The Trimount Mfg. Company, Roxbury, Mass., has broken ground for the addition to its forge shop, for which most of the equipment has already been purchased.

The Page-Storms Drop Forge Company, Springfield, Mass., has decided to build an entirely new plant, the present works at Brightwood, a suburb of Springfield, not being sufficient for the growing demands of the business. The site of the new works has not been determined, but it will be somewhere in the immediate vicinity of Springfield.

The new building of the Stevens-Duryea Company, Chicopee Falls, Mass., which was alluded to in this column last week, will be devoted to manufacturing and to the testing department. It will contain 31,360 sq. ft. of floor area. Work of construction will be rushed to the extreme limit, that the company may be able to avail itself of the increased facilities at the earliest possible moment. It is understood that orders for the new machinery for the building have already been placed.

The report that Frank Wheeler & Son, Meriden, Conn., are to build a large addition to their plant is premature, as nothing in the building line is contemplated for the present. The company manufactures punching, drawing and stamping presses and special machinery.

The American & British Mfg. Company, Providence, R. I., suffered a loss of some $125,000 by fire and explosion December 4, the Diesel engine testing building being totally destroyed, together with several completed engines. In some unknown manner the outside of the building caught fire, and the heat, increasing the pressure of a number of compressed air flasks, caused them to explode. The presence of oil played small part in the spread of the flames. The damage by both fire and explosion was local, and no interference in the output of the Corliss works in any department will result.

The Bangor Railway & Electric Company, Bangor, Maine, announces that final plans have been prepared for the power plant of the Bar Harbor & Union River Power Company at Ellsworth, Maine. The plant will be erected on the site of the old Boston Reduction Company's works. The initial capacity will be 2500 hp., electricity being generated from turbine water wheels. Provision for the extension of the plant to 20,000 hp. will be made. A dam 60 ft. in hight will provide water storage for use at times of lower water in the river. The entire electric and power system of Ellsworth will be rebuilt, it is stated, and a power transmission line to Mt. Desert Island will be arranged for.

It is understood that the New York, New Haven & Hartford Railroad will have to largely increase its power facilities at Providence, R. I., though the nature of the increase is not yet announced, and probably is not determined. When the tunnel which will be constructed through the hill to the east of the Union Station is completed trains will be hauled through it by electric power. The New Haven interests are about to absorb the street railroad lines of Providence and most of the adjacent territory, and probably a readjustment of power stations will become necessary. It may prove expedient to combine generating capacity for several purposes in one power station, which would probably mean the enlargement of the big station of the Street Railway Company at Providence.

Worcester manufacturers in the metal trades are prominent in the organization of an independent telephone company, which proposes to establish a system in Worcester in opposition to the Bell Company. The president of the new corporation, known as the Worcester County Home Telephone Company, is William H. Cook, of the Worcester Steel Foundry Company; treasurer, Charles F. Marble, of the Curtis & Marble Machine Company, manufacturer of woolen machinery, and the directors consist of Paul B. Morgan, of the Morgan Construction Company; A. W. Whitcomb, of the Whitcomb-Blaisdell Machine Tool Company, and Samuel E. Winslow, of the Samuel Winslow Skate Mfg. Company. The company's system will be a part of a general system covering other parts of New England.

Government Purchases.

WASHINGTON, D. C., December 11, 1906.

The Isthmian Canal Commission has postponed the date of opening bids for the construction of the Panama Canal until January 12.

The Bureau of Supplies and Accounts, Navy Department, Washington, will receive bids until January 2 for the following machine tools for the Eastern navy yards: Schedule 302, pipe threader, bolt cutter, engine lathe, drill press, tool grinder, &c.; schedule 303, duplex pumps, wood lathe; schedule 304, electric hoists, refrigerating plant; schedule 305, steam winches, drop hammer, centrifugal pumps.

The Bureau of Supplies and Accounts, Navy Department, Washington, will receive bids until December 26 for motors, electric grinders, air drills, pneumatic hammers, electric hoists and a large quantity of other supplies for the Eastern navy yards.

The following bids were opened December 4 for supplies for the navy yards:

Bidder 40, the Chicago Pneumatic Tool Company, New York; 43, the Cleveland Pneumatic Tool Company, Cleveland, Ohio; 56, the Crocker-Wheeler Company, Ampere, N. J.; 59, the Columbia Pneumatic Tool Company, Columbia, Ohio; 63, the Drew Machinery Agency, Manchester, N. H.; 65, the Dayton Pneumatic Tool Company, Dayton, Ohio; 68, the Detrick & Harvey Machinery Company, Baltimore, Md.; 76, the Fairbanks Company, Baltimore, Md.; 80, the Fox Machine Company, Grand Rapids, Mich.; 86, the General Electric Company, Schenectady, N. Y.; 115, the Holtzer-Cabot Electric Company, Brookline, Mass.; 117, the Ingersoll-Rand Company, New York; 119, the Independent Pneumatic Tool Company, Chicago, Ill.; 144, Manning, Maxwell & Moore, New York; 173, the Pacific Hardware & Steel Company, San Francisco, Cal.; 202, the Sprague Electric Company, New York; 208, the A. B. Sands & Sons Company, New York; 225, the Thomas Somerville Company, Washington, D. C.; 244, the Westinghouse Electric & Mfg. Company, Pittsburgh, Pa.; 257, L. F. Grammes & Son, Allentown, Pa.; 266, the Western Electric Company, New York City; class 11, two barge pumps, bidder 144, $29.80; 173, $38.84; 208, $66. Class 52, one 15-hp. motor, bidder 86, $336; 244, $365; 266, $355. Class 53, one 3-hp. motor, bidder, 86, $274; 202, $257; 244, $249.50. Class 57, three pneumatic hammers, bidder 40, $195; 43, $215; 65, $350; 117, $225; 119, $186. Class 58, 21 pneumatic drills, bidder 40, $1291.50; 43, $1635; 59, $1755; 117, $1447.50 and $1715; 119, $1188. Class 71, one induction motor and two transformers, bidder 86, $536; 244, $599; 266, $328, for part. Class 72, one motor generator set, bidder 56, $3314; 86, $2630; 244, $2445; 266, $3444. Class 73, one motor, bidder 56, $425; 86, $199; 115, $186.60; 202, $205; 244, $234; 266, $187. Class 74, one emery grinder, bidder 80, $58.90. Class 162, one band saw setting and filing machine, bidder 68, $105. Class 200, one improved key seater, bidder 63, $172; 76, $160; 257, $175.

The Robb-Mumford Boiler Company, New York, has been awarded, class 2, 24 horizontal water tube boilers, duplex piston pattern boiler feed pumps, &c., at $57,048, under bids opened November 1 for supplies for the Isthmian Canal Commission, Circular No. 335.

The Mann-McCann Company, Chicago, Ill., has been awarded contract for 10 earth spreaders for the Isthmian Canal Commission at $67,700 under bids opened October 23.

The following awards have been made for supplies for the

navy yards, bids for which were opened November 27:

The Bridgeport Safety Emery Wheel Company, Bridgeport, Conn., class 41, one electrically driven dry emery grinder, $260.04.

J. B. Roache, Brooklyn, N. Y., class 74, 25 hydraulic jacks, $854.75.

The Church Street Terminal Buildings for the Hudson Tunnels.

The proposed terminal of the Hudson tunnels, in course of construction on Church street between Cortlandt and Fulton streets, New York City, will occupy nearly two entire blocks. There will be two buildings, divided by Dey street, but with a continuous connection below ground, and speaking of the whole as the terminal, it will constitute the largest office structure in the world. It will be 22 stories high and there will be space for 6000 offices, so the combined structures will also have a larger and more varied representation of business interests than any other building of the kind in the world. It is estimated that 1000 persons will pass through its corridors each minute through the day and the permanent population will be at least 10,000 people. There will be 39 elevators, of which 22 will be express cars to the eleventh floor. The two buildings will occupy 70,000 sq. ft. of ground and the cubic area will be 14,500,000 cu. ft. above ground and 3,650,000 cu. ft. below ground.

Both buildings will be similar in design and they will be a fine example of Italian renaissance. From the ground floor to the fourth story polished granite and Indiana limestone will be used and the section above will be of brick and terra cotta. The public halls will be of marble and the interior finish will be of hardwood throughout. A feature of the building will be an electric storage battery which will be the largest in the world. This will form a reserve in case of an accident to the generating plant. There will be a complete conduit system arranged for telegraph, telephone and stock ticker systems as well as compressed air and vacuum cleaning apparatus.

To get an idea of the size of the building a comparison with the Broad Exchange Building, now the largest in Manhattan, is interesting. The Broad Exchange contains about 7,000,000 cu. ft. and nearly three Broad Exchange buildings could be put on the space occupied by the terminal building. An interesting section of the building will be an arcade on the ground floor consisting of a great glass enclosed passageway lined with shops and booths. It will be much larger than any of the famous European arcades and an attempt will be made to make it one of the great shopping centers of the world.

The arrangement of the underground part of the buildings which will form the terminal proper is especially interesting. Passengers will enter on the street floor and pass down to the station by way of easy stairways, inclined planes and elevators. The floor surface below the sidewalk will be known as the concourse floor and there will be waiting rooms, retiring rooms, ticket offices, telegraph stands, telephone booths, newspaper stands, restaurants, flower booths and everything that goes to make up a large railroad station. Below the concourse floor will be the train platforms, six in number, with five tracks alternating between them.

The cars are to be of steel and will have openings at the side and ends similar to those in use on the Brooklyn Bridge trains, and alternate platforms will be used for entrance and exit. It is proposed to operate eight-car trains through the tunnels during the rush hours on a headway of 1½ min. between trains, and the passage under the river will probably average 3 min. There will be a foot passageway extending under Dey street and connecting with the Manhattan subway and it will be possible to descend from the street to the concourse level and walk under Dey street to the Fulton station of the subway.

The Church street terminal buildings will constitute the hub upon which will be focused all the downtown traffic of the four great railway systems and trolley lines terminating in Jersey City. The tenants of the building may, without at any time going from under cover, be landed in the Pennsylvania, Erie and Lackawanna stations in Jersey City and may similarly reach the Broadway subway and be landed in the Grand Central station, New York, and Long Island station in Brooklyn. The Sixth and Ninth avenue lines of the elevated railroad system can be reached from the terminal under cover and the surface lines which will pass its several fronts. Any new subways on the west side must necessarily have connection with these buildings.

The work as a whole has been directed by William G. McAdoo, president of the New York & Jersey and the Hudson & Manhattan Railroad Companies, and Walter G. Oakman, formerly president of the Guaranty Trust Company and now president of the Hudson Companies. It was the combined activity of these two men, backed by the great banking house of Harvey Fisk & Sons, that made the enterprise possible The engineering features are being worked out by Charles M. Jacobs, chief engineer, and J. Vipond Davies, deputy chief engineer. Clinton & Russel are the architects.

PERSONAL.

Dr. William B. Phillips, Birmingham, Ala., has gone on a tour involving investigations of mineral properties in Arkansas and Texas.

J. O. Foose, chief engineer at the Brown-Bonnell and Bessemer Works of the Republic Iron & Steel Company, has resigned and has been succeeded by Arthur L. Strickland.

Harry O. Russ, New England manager of the Phoenix Iron Company and the Phoenix Bridge Company, has severed his connection with those companies to become the New England sales agent for the Eastern Steel Company, Pottsville, Pa. Mr. Russ will continue his present office at 110 State street, Boston, rooms 707-708.

F. G. Parker, superintendent of the Bessemer department of the Cambria Steel Company, Johnstown, Pa., has resigned and has been succeeded by Frank E. Thompson.

On account of illness, Joseph Thompson, superintendent of the New Castle Forge & Bolt Company, New Castle, Pa., has resigned. Benjamin Moser, assistant superintendent, is now acting as superintendent, and E. E. Whitaker has been made assistant manager.

J. A. Farrell, president of the United States Steel Products Export Company, who has been in Europe for several weeks, sails for the United States this week.

Olin A. Stranahan, sales manager of the Allis-Chalmers Company, Milwaukee, has resigned and the office has been abolished.

The order department of the Illinois Steel Company, Chicago, formerly under the management of F. E. Ford, deceased, has been transferred to the jurisdiction and management of J. P. Walker, assistant secretary.

H. A. Flagg has been appointed manager of sales of the Shelby Steel Tube Company, in charge of its New York office.

W. S. Howe, for a number of years connected with the S. A. Woods Machine Company, South Boston, Mass., has resigned to go with the Canadian Fairbanks Company, Ltd., and will be located in Montreal after January 1.

Peter Donaldson, of James Watson & Co., iron merchants, Glasgow, Scotland, is now in this country.

In addition to changes in the sales force of the Carnegie and Illinois Steel companies, referred to in these columns last week, it may be noted that Edwin S. Mills, for some years sales manager of the Cleveland office of the Carnegie Steel Company, has been appointed assistant manager of sales of the Carnegie Steel Company at St. Louis, to become effective January 1.

Electric operation of trains on the New York Central Railroad began Tuesday in a limited way, the service being confined to travel between Yonkers and the Grand Central Depot.

OBITUARY.

WILLIAM A. WHITTLESEY.

William A. Whittlesey, Pittsfield, Mass., one of the founders and for some years manager of the business of the Stanley Electric Company of that place, died suddenly December 5, aged 57 years. He was born in Danbury, Conn. After graduating from Marietta College, Marietta, Ohio, he was engaged in various lines until 1886, when he moved to Pittsfield, where he took charge of the business of the Pittsfield Illuminating Company. Two years afterward he consolidated that company with the Pittsfield Electric Light Company as the Pittsfield Electric Company. In the early '90's he became interested in some of the electrical inventions of William Stanley of Great Barrington, Mass., and induced him to associate himself with a number of Pittsfield men in the establishment of a company, which would bear the inventor's name. Mr. Whittlesey was the manager and treasurer of the corporation, and the business grew with great rapidity. In 1896 Mr. Whittlesey retired from the active membership of the company to give his entire time to the Pittsfield Electric Company, but retained a place on the Board of Directors. To-day the Stanley business is a part of the General Electric Company, and the Pittsfield works, now the Stanley-G. I. Electric Mfg. Company, employ about 2000 people. Mr. Whittlesey served in the Massachusetts House of Representatives and Senate. He was prominent as a Mason, and was a member of the New England Society of New York. Mrs. Whittlesey, who survives him, was a daughter of Henry Tilden, and a niece of Samuel J. Tilden. There is one daughter.

CHARLES DONNELLY.

Charles Donnelly, one of Pittsburgh's foremost citizens, a noted art collector and well-known philanthropist, died December 5, aged 65 years. He was born in Londonderry, Ireland, and came to this country with his father, an officer in the English army, in 1849. The family settled in Ohio. Mr. Donnelly went to Pittsburgh in 1865 and became bookkeeper for James M. Cooper, later associating himself with the National Massachusetts and other copper companies. In 1868 he entered the service of the Pittsburgh & Connellsville Railroad, first as auditor of disbursements and later as treasurer and vice-president. During his association with the road he developed it extensively until it was taken over by the Baltimore & Ohio Railroad and used as the entrance link into Pittsburgh. Together with Bernard Rafferty, Mr. Donnelly entered upon large ventures after resigning from the railroad in 1882. Among these enterprises were the McClure Coke Company, Thompson-Connellsville Coke Company, and the establishment of the Pittsburgh Terminal Railroad and Coal companies and the West Side Belt Line, which was sold to the Wabash interests. In recent years Mr. Donnelly had devoted most of his attention to real estate operations. He was a member of the Pittsburgh, Duquesne, Country, and other clubs, and was president of the Castle Shannon Savings & Trust Company and the Pittsburgh Milling Company, director in the Diamond National Bank, First National Bank of Allegheny, Glenwood Land Company, Diamond Savings Bank, Colonial Trust Company, First National Bank of Pittsburgh, and Union Natural Gas Company, and was affiliated with many other industrial and financial organizations.

HENRY J. HENDEY, president of the Hendey Machine Company, Torrington, Conn., died December 8, after an illness of several weeks. He was a native of London, England, and was 62 years old. With his brother Arthur he founded in 1870 the business now conducted by the Hendey Machine Company. A widow and two daughters survive him.

Consul J. C. McNally of Liege reports that the Belgian Government has contracted for 15,000 tons of rails for use on its State railroads, of about 88 lb. to the yard, and at a uniform price of $30.68 a metric ton, which was the bid of the Belgian companies, those of France being about $33.77 a ton.

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HARDWARE

THESE are times in which the jobbing trade are given special opportunities to make money, in view not only of the volume of business and the readiness with which sales are effected, but also because of the advancing prices which are constantly enhancing the market value of their stocks of merchandise. It is with all of them a practical question when an advance has been made by the manufacturers of a given line of goods whether their selling prices shall promptly be marked up accordingly. With many this course is undoubtedly pursued with businesslike alacrity, and a good broad margin of profit thus secured. Others, however, as is admitted by the jobbers themselves, frequently neglect thus to take advantage of the upward movement of the market, it being deemed better policy to give their customers the benefit of purchases on the basis of the former lower cost.

In this connection there is an illustration of the advantage to the retail merchant of being well posted in regard to course of prices. If through the columns of *The Iron Age* or other sources of information he is kept advised of the upward movement in the market he is obviously in a position to buy more intelligently and to obtain better prices from the jobbers from whom he purchases. As a matter of fact if he is informed as to the advance in a given line he will often be able to place his order at a lower figure than if he was in ignorance of the change which has taken place in the price of the goods.

Complaint has often been made by the jobbing trade that they are unable to make money on certain staple goods, such for example as Nails and the leading Wire products, in which an effort is made by the manufacturers to maintain a differential between the price to the wholesale and to the retail trade. The disposition is to cut the price to the lowest figure possible without involving an actual loss, the result being that the margin of profit is exceedingly close. In this way low and irregular prices are in many lines developed, thus robbing the jobber of profit to which he is legitimately entitled. That it is not possible for the manufacturers to protect the jobbers in such cases is obvious, the market price on many goods being made, so far as the retail trade are concerned, by the jobbers, who sell the goods to the retail distributers at lower prices than they can be purchased from the manufacturers.

An illustration of the condition of things in this regard is given in the fact that a very prominent manufacturer of a most important line has taken occasion to address a letter to his jobbing customers urging them to maintain the differential which has been established by the manufacturers between the jobbing and the retail trade, and intimating that many of the jobbers are uniformly failing to do so. He mentions that in his opinion there will not be enough goods made to supply the requirements of the trade in this line for the coming season on account of many interferences with the production, as for example, the shortage of steel and lack of sufficient labor, with an exceptionally heavy and persistent demand. He therefore reminds the jobbers that it would be the part of wisdom for them to market their goods at the full price established for the retail trade. The jobbers' course heretofore has not been in accordance with this very sensible advice. It remains to be seen whether or not they will act on the timely suggestion thus given them.

The first gun in the parcels post campaign during the present short session of Congress has been fired, a resolution having been presented in the House calling upon the Secretary of Commerce and Labor to investigate the operation of the parcels post in England, France and Germany and to report thereon at an early date. This is an exceedingly ingenious method of bringing data concerning the parcels post before Congress. The Department of Commerce and Labor, under the peculiar provisions of the law by which it was created, is required to undertake an investigation and furnish a report thereon upon the resolution of either house, while the other departments require a joint resolution of both houses when an investigation of any kind involving the expenditure of money is contemplated. Such report, if ordered and made, will undoubtedly recognize and emphasize the very different conditions which prevail in these European countries as compared with those in the United States, where with its great extent of territory and many sections of sparse population it would obviously be impracticable to maintain a parcels post on the same lines and at the same charges as, for example, in England, small and densely populated.

Condition of Trade.

The heavy volume of current business, the scarcity of goods and the strength of the market are the prominent features of the situation. Notwithstanding the fact that the holidays and the end of the year are close at hand there is little diminution in the pressure of orders, and with the difficulty and delay in getting goods in almost every line this pressure is intensified by the efforts made to hurry shipments. Under the influence of these conditions merchants are in frequent communication by letter or wire with manufacturers, who in their turn are with few exceptions operating their factories under pressure and with the attendant disadvantages of producing goods under such conditions. The matter of prices is naturally commanding a good deal of attention, especially from the manufacturers on whom rests the responsibility of deciding the course to pursue in regard to their own products. There has been a marked increase in the cost of goods, owing to the important advances which have taken place in the price of material of practically every kind, but this increased cost is not as yet represented in the selling prices of all the manufacturers. Many of them are recognizing the fact that if present conditions continue it will be necessary to announce advances, but they are reluctant to take this action at all prematurely. There is, however, reason to believe that about the first of the year a good many changes will take place and manufacturers who have very conservatively been holding back will then announce higher prices for their products. The purchasing of the trade so far from being diminished by the advances which have occurred affords an illustration of the recognized principle that it is easy to sell goods on a rising market. There has been indeed a good deal of buying for spring and summer require-

ments, the large trade placing their orders for many lines at a somewhat earlier date than usual. The well-being of the people throughout the country and the fact that they have more money than usual to spend on the comforts and even the refinements and luxuries of life is making an increasing demand for fancy goods and the finer products in the Hardware field. Under this influence, coupled with the enterprise and energy of the merchants, many Hardware stores are assuming an attractiveness which did not characterize them a few years ago.

Chicago.

(By Telegraph.)

In the heavier lines the Hardware trade continues to maintain the phenomenal pace of the more favorable months of the year, and there is now every indication that the present abnormal activity will continue to the holidays. The approach of the inventory period has only affected the lighter lines, such as Shelf Hardware and the seasonable goods, which have made way for the display of holiday ware. The open weather has been favorable to a continued heavy consumption of Wire products, recent advances having stimulated rather than checked buying. New orders closed the first week of this month show a larger daily average than during like periods in October and November, notwithstanding the fact that these months are the most favorable for the Wire trade. Heavy purchases of Barb Wire are already being made for the spring trade, distributors having decided to place their orders early to secure deliveries. Shipments are still being prorated by the mills, in order that a more equitable distribution of material may be effected, and as a result of this policy none of the jobbers is carrying a surplus of stock. In the Sheet trade deliveries are deferred from two to three months, and some of the mills are asking premiums of $1 a ton for better deliveries. While collections are somewhat slow, it is customary at this season; nevertheless, there is no decline in the number of retail merchants that make a practice of discounting their bills.

NOTES ON PRICES.

Wire Nails.—Demand is more active than usual at this season, while stocks in jobbers' hands are reported as being low. Mills are not accumulating stocks, and shipments are somewhat slow and scarcely up to the requirements of the trade. In addition to new business the mills are occupied on contract orders placed previous to the recent advances. Scarcity and high prices of Steel and the advance in wages which goes into effect January 1 doubtless influenced the advance in prices which took place on December 4. Quotations are as follows, f.o.b. Pittsburgh, plus actual freight to point of delivery, 60 days, or 2 per cent. discount for cash in 10 days:

Carloads, to jobbers	$2.00
Carload lots, to retail merchants	2.05

New York.—Local demand begins to show something of a falling off as the end of the year approaches. Preparations for continued building are in evidence in this city, as shown by digging cellars which is made possible by the absence of frost in the ground. Jobbers complain that Nails are coming forward slowly from the mills. New York quotations are generally firm on the following basis: To retailers, carloads on dock, $2.19; less than carloads, on dock, $2.33; small lots, at store, $2.30.

Chicago.—Demand for all lines of Wire products shows no decline notwithstanding the season, and the average tonnage booked by the leading interest thus far this month is greatly in excess of the record for the same period in November. This abnormal activity is without precedent in the trade, and is attributed to the great prosperity prevailing throughout the country. Stocks of Nails are generally low, and the mills are carefully distributing their output to avoid an accumulation of any single distributing interest at the expense of another suffering from a shortage. The advance of $2 a ton which became effective last week has not curtailed the demand, while in some districts buying has been stimulated. The advance of $2 a ton on Wire Rods, which establishes a Chicago delivered price of $40 a ton, reduces the spread between the raw material and the finished product to $3 a ton, which barely covers the cost of the kegs and scrap. Fortunately none of the independent mills has been compelled to buy even for immediate requirements on this basis. Quotations are firmly maintained as follows: $2.15 in car lots to jobbers, and $2.20 in car lots to retailers, with an advance of 5 cents for less than car lots from mills.

Pittsburgh.—The announcement of an advance of $2 a ton in prices of Wire Nails, effective December 4, was a surprise to the trade, which did not expect higher prices until after the first of the year at least. Manufacturers point to the fact that prices of steel are very high, while it is scarce and hard to obtain, and also to the fact that a general advance in wages will go into effect January 1, these being set forth as the reasons for the recent advance. Demand for Wire Nails is fairly active, but most of the large trade covered its requirements for some time ahead prior to the recent advance in prices of November 10 and December 4. Stocks of Nails that may accumulate during the decline in demand will be utilized for filling orders for spring trade. Quotations are as follows, f.o.b. Pittsburgh, plus actual freight to point of delivery, 60 days, or 2 per cent. discount for cash in 10 days:

Carloads, to jobbers	$2.00
Carload lots, to retail merchants	2.05

Cut Nails.—The scarcity of certain sizes of Cut Nails at mill continues to be a feature of the situation, together with the broken assortments in jobbers' hands. Mills are generally behind in shipments, while demand continues active for the season. Quotations are as follows, f.o.b. Pittsburgh: Carload lots, to jobbers, $2.05; less than carloads, to jobbers, $2.10; less than carloads, to retailers, $2.20. Iron Cut Nails at points west of Buffalo and Pittsburgh are held at 10 cents advance on Steel Cut Nails.

New York.—While stocks are still broken in their assortments the somewhat lessened demand makes this fact less prominent. Stocks purchased at previous lower prices in the hands of smaller distributers cause some irregularity in prices, but the market is generally firm at the recent advances, quotations for small lots at store being on the basis of $2.30.

Chicago.—Car lot shipments of the smaller sizes of Iron and Steel Cut Nails are now deferred from three to four weeks, most of the mills now operating on larger sizes for the railroad trade. Stocks in jobbers' hands are low, while the consumptive demand shows no appreciable decline. We quote: Iron Cut Nails, car lots, to jobbers, $2.25; to retailers, $2.30; Steel, to jobbers, in car lots, $2.15; to retailers, $2.20.

Pittsburgh.—Following the advance of 10 cents per keg in prices of Wire Nails, effective December 4, the Cut Nail Association made a similar advance, or to the base of $2.05, Pittsburgh, for base sizes, in carload lots. Demand for Cut Nails continues fairly active and the mills are short of certain sizes, while stocks in jobbers' hands are reported to be badly broken. We have advanced prices 10 cents per keg and now quote as follows, f.o.b. Pittsburgh: Carload lots, to jobbers, $2.05; less than carloads, to jobbers, $2.10; less than carloads, to retailers, $2.20. Iron Cut Nails at points west of Buffalo and Pittsburgh are held at 10 cents advance on Steel Cut Nails.

Barb Wire.—Some orders have been already placed for future shipment by the large trade, while the balance of the spring requirements is expected to be placed soon after the first of the year. Quotations are as follows, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days:

	Painted.	Gal.
Jobbers, carload lots	$2.15	$2.45
Retailers, carload lots	2.20	2.50
Retailers, less than carload lots	2.30	2.60

Chicago.—Large jobbers have been buying freely to cover their future requirements, much of the tonnage for

the spring trade already having been placed with the mills. In previous years this buying was done in January, but difficulties experienced in securing shipments have resulted in jobbers anticipating their wants, many orders having been booked prior to the recent advance of $2. Quotations are as follows: To jobbers, Chicago, car lots, Painted, $2.30; Galvanized, $2.60; to retailers, car lots, Painted, $2.35; Galvanized, $2.65; retailers, less than car lots, Painted, $2.45; Galvanized, $2.75; Staples, bright, in car lots, $2.25; Galvanized, $2.55; car lots to retailers, 10 cents extra, with an additional 5 cents for less than car lots.

Pittsburgh.—As usual at this season of the year demand for Barb Wire is very light and the mills are now accumulating stock to fill orders for spring trade, which are expected to come in very shortly after the first of the year. The market is firm and it is claimed the recent advance in prices is being firmly held. Quotations are as follows, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days:

	Painted.	Gal.
Jobbers, carload lots	$2.15	$2.45
Retailers, carload lots	2.20	2.50
Retailers, less than carload lots	2.30	2.60

Smooth Fence Wire.—Specifications on contract orders from Wire Fence manufacturers are especially heavy, and mills are considerably behind in filling orders. Quotations are as follows, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days:

Jobbers, carloads	$1.85
Retailers, carloads	1.90

The foregoing prices are for base numbers, 6 to 9. The other numbers of Plain and Galvanized Wire take the usual advances, as follows:

	6 to 9	10	11	12&12½	13	14	15	16
Annealed	Base	$0.05	.10	.15	.25	.35	.45	.55
Galvanized	$0.30	.35	.40	.45	.55	.65	1.05	1.15

Chicago.—Specifications on contracts continue to tax the capacities of the mills, and shipments on many sizes are deferred from 30 to 60 days. The advance of $2 which became effective last week will apply on a comparatively small tonnage only, as most of the large consumers are covered through the first half of next year at lower prices. We quote $2 f.o.b., Chicago, in car lots; retailers, $2.05.

Pittsburgh.—Demand continues unusually heavy, especially from Wire Fence manufacturers, and the mills are from four to six weeks behind in deliveries. The supply of Steel is short, and cars are not as plentiful as are needed to handle the heavy shipments of the mills. We are advised that the advance in prices of $2 a ton, effective from December 4, is being firmly held. Quotations are as follows, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days:

Jobbers, carloads	$1.85
Retailers, carloads	1.90

The foregoing prices are for base numbers, 6 to 9.

Sheet Zinc.—The Zinc market, which has twice moved up within the last few weeks, exhibits sustained strength, and a further advance of 10 cents per 100 lb. was announced under date of December 7. This makes the price $8.10 per 100 lb. in 600-lb. casks, of the thicknesses from Nos. 9 to 22, inclusive, and of the widths from Nos. 32 to 58 in., inclusive, and of the lengths from 72 to 96 in., inclusive. There are the usual extras for other sizes and numbers and the usual discounts, as follows:

	Cash with order. per cent.	Quantity. per cent.	Total. per cent.
Carload lots	3	5	8
9000-lb. lots	3	3	6
6000-lb. lots	3	2	5
3000-lb. lots	3	1	4
Less than 3000 lb.	3	0	3

Wagon Woodwork.—The demand for Bent Buggy and Wagon Material, Wheels, &c., at the present time, is greater than the output of the manufacturers, and the price of the raw material is two or three times as much as it was five to ten years ago, while the quality is inferior, as that now being cut is what has heretofore been left standing, on account of size and low quality. The increasing scarcity of timber suitable for Wagon Woodwork is an important feature of the situation, and on this account Steel Gears are being made with as little wood as possible. The tremendous growth of the automobile industry has increased the demand for Carriage Woodwork in a remarkable degree. The term Wagon Woodwork includes Hickory, Oak, Ash and Poplar, principally Hickory and Oak. The difficulty in securing Hickory has been intensified during the last three months by the long and continued wet weather in the South, while long hauls by wagon over bad roads largely increases its cost. Oak is also scarce and is being bought up for finishing Lumber and Furniture Work. In parts of the country from which the bulk of supplies was formerly obtained, Hickory timber is practically all cut, while Ash is in small bunches and held by farmers, who do not like to cut it. The cost of Finished Woodwork has been advancing slowly, but not in proportion to the rise in the cost of timber. The outlook is that the scarcity in timber will become more pronounced and that prices on finished material will gradually advance.

Tacks.—The improved condition of the Tack market is indicated in the prices printed below, which are those of the Grand Crossing Tack Company, Grand Crossing, Ill., terms 30 days, or 2 per cent. discount for cash in 10 days:

Basket Nails				75 and 10%
Basket Tacks				90 and 30%
Berry Box Tacks				90 and 30%
Bill Poster Tacks				90 and 45%
Brush Tacks				80%
Burrs				60 and 10%
Carpet Tacks, ½ and ¼ wt., Silver or Blued				90 and 35%
Carpet Tacks, ½ and ¼ wt., Tinned or Coppered				90, 35 and 10%
	Per 100 dozen.			
	6	8	10	12 oz.
75 Count—Silver or Blued	$5.25	$5.56	$6.18	$6.79
Tinned or Coppered	5.87	6.18	6.79	7.41
100 Count—Silver or Blued	6.49	6.79	7.41	8.03
Tinned or Coppered	7.41	8.03	8.64	9.26
				Per gross.
250 Count—Silver or Blued, "Guaranteed Count"				$2.16
Tinned or Coppered, Guaranteed Count				2.50
500 Count—Silver or Blued, America's Best, $3.70; plain paper boxes				3.70
Tinned or Coppered, $4.32; plain paper boxes				4.32
¼-lb. Papers—Silver or Blued, Fort Dearborn				2.50
Tinned or Coppered, Fort Dearborn				2.80
				Per box.
House Tacks, Blued				$2.16
Chair Nails				80%
Cheese Box Tacks				90 and 37½%
Cigar Box Nails				70%
Clout and Trunk				80%
Clout and Trunk, Tinned				80%
Cobbler Nails, Iron, ¼ pas. 3-8 & 3½-8, 22½c.; 4-8 & 1 gr., 20½c.; 2 oz. pas. 3-8 & 3½-8, 12¼c.; 4-8 & 1 gr. 11¼c. per doz.				
Cobbler Nails, Brass-Plated, 3-8 & 3½-8, 31½c.; 4-8 & 1 gr., 30c.; 2 oz. pas. 3-8 & 3½-8, 16¾c.; 4-8 & 1 gr. 15¾c. per doz.				
Copper Clout Nails and Tacks				25%
Cooper's Tacks				90 and 37½%
Curtain Tacks				90 and 45%
Cut Tacks, Blued, ¼ and ½ wt.				90 and 35%
Double Pointed Tacks, papers				90 and 10 and 10 and 10%
Double Pointed Tacks, bulk				80 and 20%
Dowel Pins—Wire Nail List				85 and 10%
Escutcheon Pins, Iron				60%
Finishing Nails				70%
Gilt Nails				30%
Gimp and Lace Tacks				90 and 45%
Glazier Points, ⅛-lb. pas., $13; ¼-lb. pas.				$13.30 per 100 lbs.
Hungarian Nails, 4-8 and longer, 2-lb. dozens, $13; 2½-lb. dozens, $16.50; 3-lb. dozens				$17.60 per 100 dozens.
Hungarian Nails, ½ wt.				80 and 20%
Improved Brass Shoe Nails, 4-8 and longer, ¼-lb. pas., $30.25; less than ¼-lb. pas.				$31.50 per 100 lbs.
Japanned Solid Heads, in papers, 60%; in bulk				80%
Leathered Carpet Tacks				45 and 10%
Lining and Saddle Nails, Silver, 34%; Japanned				44%
Looking Glass Tacks				65%
Picture Frame Points				75%
Rivets, except Copper				70%
Shade Nails—Wire Nail List				85 and 10%
Staples—Barbed Blind				80 and 15%
Netting—Galvanized				85, 10 and 10%
Wire Cloth, bulk, 80%; papers				90%
Steel Carpet Tacks, bulk				90 and 50%
Steel Carpet Tacks, bulk, Tinned or Coppered				90, 50 and 10%
Swedes Carpet Tacks, bulk				90 and 45%
Swedes S S				90 and 35%
Swedes Tacks, Jay-Eye-See				85 and 15%
	6-8	7-8	1	1¼ in.
Tin Cap Nails	$14.20	$11.75	$10.50	$9.90 per 100 lbs.
	8	10	12	14 oz.
Tin Cap Tacks	$24.70	$23.50	$22.50	$21.00 per 100 lbs.
Trunk Tacks				90 and 45%
Trunk Tacks, Tinned				90, 45 and 10%
Upholster Tacks				90 and 45%
Wire Nails and Brads				85 and 10%

In weight goods dozened the above discounts are for straight weights. Light weights cost 10 and 5% less. Straight weights will always be sent unless light weights are specified.

Auger Bits.—Attention has been called in recent issues of *The Iron Age* to the tone of the market for common Auger Bits, which is notably steady and marked by increasing strength. It is stated that concessions frequently given on these goods are difficult if not impos-

sible to obtain, and persons usually well informed express the opinion that higher prices may be expected as a result of the more harmonious relations now prevailing among competing manufacturers.

Conductor Pipe and Eaves Trough.—The meeting of manufacturers of Conductor Pipe, &c., recently held in this city, as reported in our last issue, resulted in a continuance of the arrangement under which the leading producers are working with more or less harmony in the marketing of their output. This was the outcome generally expected and would seem to insure stability of prices for the coming three months or until the next quarterly meeting of the association. Owing to advances in sheet metal a general advance of 2½ per cent. in finished products was decided on, the following being the discounts recommended to the jobbing trade for the various territorial districts:

	Territory.			
	Eastern.	Central.	Western and S'thern.	South-w'tern.
Conductor Pipe:	Per ct.	Per ct.	Per ct.	Per ct.
Galvanized Steel, standard sizes and gauges	70-2½	65-12½	65-7½	62½-5
Galvanized Steel, irregular sizes and gauges	75	70-12½	70-7½	65-12½
Galvanized C. C. Iron, standard sizes and gauges	60	55-5	55	50-2½
Galvanized C. C. Iron, irregular sizes and gauges	75	70-12½	70-7½	65-12½
Copper, 14, 16 and 20 ounces	30-10	30-7½	30-5	30-2½
Eaves Trough:				
Galvanized Steel, standard sizes and gauges	70-30-2½	75-10-5	75-10	75-2½
Galvanized Steel, irregular sizes and gauges	75-2½	70-15	70-7½	65-12½
Galvanized C. C. Iron, standard sizes and gauges	70-2½	65-12½	60-15	65
Galvanized C. C. Iron, irregular sizes and gauges	75-2½	70-15	70-7½	65-12½
Copper, 14, 16 and 20 ounces	30-10	30-7½	30-5	30-2½
Miters, End Pieces and Drops:				
Galvanized Steel	35	35	35	35
Galvanized Charcoal Iron	List net	List net	List net	List net
Plain Ridge Roll and V. Ridge Cap:				
Galvanized Steel	80-7½	80-2½	75-15	75-7½
Galvanized C. C. Iron	70-10	70-2½	65-7½	65
Formed Valley:				
Galvanized Steel	75-5	70	65-7½	65
Galvanized C. C. Iron	60	55-5	50-7½	50

One territorial change was made affecting the State of Tennessee, which was transferred to central territory.

Bright Chain.—Quotations on Trace and Wagon Chain, Cow Ties, &c., are showing noteworthy firmness, and a distinct advance was announced last week by a leading manufacturer. This amounts to 5 per cent. on Halters and Ties and Chains in the Eastern list, while on Western Standard Traces the advance is 2 cents per pair on Nos. 2 and 3 and 3 cents per pair on Nos. 1 and 0.

Bolts, Stove and Tire.—In view of the irregularity which has prevailed for the past year the market for Stove and Tire Bolts is noticeably steady. Quotations have not changed since the advance announced in these columns two weeks ago, but prices are holding very firm and show an improved tone, which is indicated by the fact that considerable uniformity is observed in the discounts of different manufacturers.

Window Glass.—As the result of a meeting of a committee representing the Eastern Glass Jobbers' Association and representatives of the Executive Committee of the National Brokerage Company, a large order for Glass was placed by the former, at concessions from the quoted price of 90 and 5 for single, and 90 and 10 per cent. discount for double strength Glass, from the manufacturers' list.. According to reports the brokerage company restricted the order to 250,000 boxes, and some manufacturers were not in favor of accepting the order at lower than regular quotations, as it was anticipated that they would get higher prices in the future. Specifications for one-third of the order are to be made at once, one-third in 15 days and the other third in 30 days. A similar meeting was scheduled to be held by representatives of the brokerage company and of the Western Glass Jobbers' Association, but no authentic information as to the results of the meeting has yet been received. It is considered probable, however, that the Western jobbers also placed an order for a large quantity of Glass. If this is the case the Window Glass business has been placed on a firmer basis than it has enjoyed for some time. Local demand has improved with cooler weather and the anticipation of still lower temperature. No change has taken place in prices. Jobbers' quotations, from jobbers' list, October 1, 1903, are as follows: Greater New York, 90 and 10 per cent. discount for all sizes, single and double strength; outside of Greater New York, 90 and 5 for single and 90 and 10 per cent. discount for double strength Glass.

Linseed Oil.—In the local market demand is comparatively light. Large buyers generally placed liberal orders sometime since on the basis of about 35 cents per gallon for out of town Raw, covering their probable requirements to early spring. It is thought that a price of 4 cents below regular quotations might result in some contract sales for large lots of Oil. Crushers cannot generally expect much of a buying movement before March, when as much Oil is contracted for in the late fall as there has been this year. It will be recalled that a very large buying movement took place about the same time in 1905, and that it was not until quite late in the summer of this year that there was a revival of business of any magnitude. The point has been made that the outlook for lower prices is unwarranted, as crushers have covered their principal requirements of seed for the next few months at a relatively high level. This will depend to a considerable extent on how long crushers will be willing to wait for business at the present quotations. While the market is not considered weak, present prices offer no inducement to buy beyond immediate requirements, which are light. New York quotations are as follows, according to quantity: City Raw, 42 to 43 cents per gallon; out of town Raw, 41 to 42 cents per gallon. Boiled Oil is 1 cent per gallon over Raw.

Spirits Turpentine.—The local market is quiet, demand being limited to immediate requirements. This is not unusual at this season, when it is undesirable to accumulate stocks, it being near inventory time. Active operations have not yet commenced in the Turpentine belt, according to reports, toward box cutting for the next crop, but are expected to begin some time this month. Prices have shown an advance of 1 cent during the week. New York quotations are as follows, according to quantity: Oil Barrels, 70 to 70½ cents; Machine Made Barrels, 70½ to 71 cents per gallon.

Rope.—New business is not as brisk as it was during November, and manufacturers are not obliged to operate their factories at night to keep up with shipments. They are, however, busy filling contract orders, of which a large number were placed. New York quotations are as follows: Pure Manila, 12½ to 13 cents; B quality, 11½ to 12 cents; Pure Sisal, 9¼ cents; No. 2 quality, 8 cents; No. 1 Jute, ¼ in. and up, 8¼ to 8½ cents; No. 2 Jute, 7¾ to 8 cents per pound.

THE manufacturing business of John R. Keim, Buffalo, N. Y., has been acquired by a new corporation organized under the style of John R. Keim Mills (Incorporated). With increased facilities the managers of the former concern, together with the new interests which are associated with them, will continue the business with greater enterprise and vigor than ever. The Keim products include Cycle Materials, Hardware Specialties, Metal Stampings, Screw Machine Supplies and Automobile Parts.

THE ALLEN-SPARKS GAS LIGHT COMPANY, Lansing, Mich., is now prepared to meet promptly the requirements of the trade in this line. Several months since the factory of the company was removed from Grand Ledge, the former location, to Lansing, where materially larger quarters have been provided. The Allen Lighting System, manufactured by the company, is referred to as producing a fixed gas, giving a perfect light with no flickering and no smoke.

WINDOW FRONT OF A MILWAUKEE STORE.

THE ample window front of the Kiefer-Haessler Hardware Company, Milwaukee, Wis., is reproduced herewith. The company occupies a double store at 433 and 435 Milwaukee street. The entrance to the upper part of the building is through a door at the left of the picture. It will be observed that the company is alive to the value and importance of attracting public attention to its establishment by means of the windows, the entrance to the store proper being of very modest dimensions, while the space given up to window display is relatively very large. The company is noted for the skill and taste shown in its arrangement of goods in the windows. The back of the windows is entirely open and there are no partitions separating them from the store. Such background as there may be is furnished by the larger articles used in display. It will be perceived that one window is devoted largely to Stoves and Ranges, while the other exhibits examples of Builders' Hardware, Kitchen Utensils, &c. The company carries a high grade of House Furnishings and Kitchen Articles, and aims to handle specialties in this line which are not included in department store stocks in Milwaukee. A large assortment of Brass and Wrought Iron Fire Place Goods is also carried, as well as an extensive stock of Stoves and Ranges. Refrigerators are also a large issue with the company, several well-known makes being handled. In addition a line of Refrigerators of its own manufacture is sold.

Ample Window Front of a Milwaukee Store.

Retail Hardware Conventions.

THE State Retail Hardware Associations, which hold their annual meetings during the early months of the year, and which have so far selected dates for the 1907 gatherings, are given below. The associations are listed in the order in which their conventions will be held. Many of the associations will make a special feature of exhibits by Hardware manufacturers and jobbers, and where this is the case the fact is noted:

INLAND EMPIRE IMPLEMENT AND HARDWARE DEALERS' ASSOCIATION, Spokane, Wash., January 16 and 17. Secretary, E. W. Evenson, Spokane.

MISSOURI RETAIL HARDWARE ASSOCIATION, Kansas City, January 17 and 18. Secretary, Fred. Neudorff, St. Joseph.

TEXAS RETAIL DEALERS' HARDWARE AND IMPLEMENT ASSOCIATION, Dallas, January 22, 23 and 24. Secretary J. W. McManus, Waxahachie.

NORTH DAKOTA RETAIL HARDWARE ASSOCIATION, Minot, February 5, 6 and 7. Secretary, C. N. Barnes, Grand Forks.

NEBRASKA RETAIL HARDWARE ASSOCIATION, Omaha, February 5, 6 and 7. Hardware exhibition. Secretary, J. Frank Barr, Lincoln.

WISCONSIN RETAIL HARDWARE ASSOCIATION, Milwaukee, February 6, 7 and 8. Hardware exhibition. Secretary, C. A. Peck, Berlin.

WEST VIRGINIA RETAIL HARDWARE ASSOCIATION, Clarksburg, February 12 and 13. Secretary, J. H. Krepps, Morgantown.

PENNSYLVANIA RETAIL HARDWARE ASSOCIATION, Pittsburgh, February 12, 13 and 14. Secretary, J. E. Digby, McKees Rocks.

SOUTH DAKOTA RETAIL HARDWARE ASSOCIATION, Mitchell, February 12, 13 and 14. Hardware exhibition. Secretary, Noah Keller, Woonsocket.

ILLINOIS RETAIL HARDWARE ASSOCIATION, Chicago, February 14, 15 and 16. Hardware exhibition. Secretary, Leon D. Nish, Elgin.

NEW YORK STATE RETAIL HARDWARE ASSOCIATION, Syracuse, February 19, 20, 21 and 22. Hardware exhibition. Secretary, John B. Foley, Syracuse.

IOWA RETAIL HARDWARE ASSOCIATION, Des Moines, February 19, 20, 21 and 22. Hardware exhibition. Secretary, A. R. Sale, Mason City.

INDIANA RETAIL HARDWARE ASSOCIATION, Indianapolis, February 20, 21 and 22. Hardware exhibition. Secretary, M. L. Corey, Argos.

OHIO RETAIL HARDWARE ASSOCIATION, Columbus, February 26, 27 and 28. Hardware exhibition. Secretary, Frank A. Bare, Mansfield.

MINNESOTA RETAIL HARDWARE ASSOCIATION, St. Paul, February 26, 27, 28, March 1. Hardware exhibition. Secretary, M. S. Mathews, Boston Block, Minneapolis.

The associations in California, Colorado, Connecticut and Kentucky, whose meetings are also usually held in February or March, have not yet determined dates.

Association Notes.

The officers of the New York State Retail Hardware Association refer to the prospects as pointing to an especially large and enthusiastic convention at Syracuse on February 19, 20, 21 and 22. As before noted, the entire Alhambra Building has been engaged for the gathering, and provision has been made for Hardware exhibits by manufacturers and jobbers. A large proportion of the spaces for exhibits has already been taken, and the entire capacity will, it is expected, soon be exhausted. This year, for the first time, the convention will extend over a period of four days. This will provide abundant time for the different sessions and for the inspection of exhibits, which promise to be of an interesting and varied character.

A meeting of the Executive Committee of the Pennsylvania Retail Hardware Association was held at the Seventh Avenue Hotel, Pittsburgh, on November 27. Plans for the annual convention were thoroughly discussed and the date of the meeting was fixed for February 12, 13 and 14. The following Committee of Arrangements was appointed by the president: W. V. Taylor, Jno. F. Howe, J. H. Bowers, Geo. J. Rudolph and Secretary-Treasurer J. E. Digby. The convention will be held at Pittsburgh, which city was chosen at the last annual convention.

Parcels Post and Postal Matters.

(FROM OUR SPECIAL CORRESPONDENT.)

WASHINGTON, D. C., Dec. 11, 1906.

THE 1906-1907 parcels post campaign in Congress has been initiated by Representative McNary of Massachusetts. Mr. McNary has offered a resolution in the House which instructs the Secretary of the Department of Commerce and Labor to inquire into the operation of the parcels post in England, France and Germany, and to make report at an early date. This is a very ingenious method of getting data relative to parcels post before Congress. The other departments of the Government require a joint resolution of both Senate and House before an investigation of any sort involving a money outlay can be ordered. The Department of Commerce and Labor, however, under the peculiar provisions of the law under which it was created, is obliged to carry out an investigation and furnish a report of its findings upon a resolution of either branch of Congress.

Under a rule of the House, also, Mr. McNary can make progress with his resolution, even should the House Post Office Committee, to which it has been referred, refuse or fail to report it favorably. After a reasonable length of time it will be in order for him to move to discharge the committee from the further consideration of the resolution and call it up for action on the floor. As it is in the form of an apparently harmless request for information it is quite probable that the House would adopt it without debate. Mr. McNary has placed upon the parcels post project the stigma of a socialistic proposition, however, for he has presented at the same time two other resolutions which look to the Government ownership and operation of the railroads and telegraph lines of the country.

The Postmaster-General's Annual Report,

which has just been submitted to the President, contains much matter of vital interest to the retailers of the country. Mr. Cortelyou renews his former recommendations with regard to the consolidation of third and fourth class mail matter, thereby reducing the postage on merchandise from 16 to 8 cents per pound, and the authorization of a postal check currency. He also recommends the adoption of the so-called Bristow plan permitting the handling of parcels on rural routes at a special rate of postage, and he asks Congress to materially increase the present compensation of rural carriers.

Domestic Parcels Post.

With regard to a domestic parcels post, Mr. Cortelyou makes a conservative statement in connection with a summary of improvements in the service which he thinks should be provided for at the earliest practicable date. He says:

> There can be further economies in rural delivery without any impairment of that service. By a more precise method of determining the basis of pay for the transportation of the mails, the department can be relieved of an unbusinesslike feature of administration with a probable decrease in expenditures. By the enactment of a sensible law as to second-class matter the department and reputable publishers can be saved embarrassments they now suffer, and the postal receipts be materially increased. By a proper system of accounting the department can be placed upon a better business footing and incidentally credited with work for which it now receives no credit. And as a result of these and other needed changes the deficit, which is in fact only a paper deficit, can be altogether eliminated. Progress toward these improvements will open the way for investigations to determine the feasibility of the adoption of many important policies of administration—reduction of postage, both domestic and international, postal savings banks, parcels post, postal telegraph and telephone, and others—the merits and defects of all of which should have in the not distant future the fullest consideration.

It is clear from Mr. Cortelyou's statement that he anticipates that the question of the establishment of a domestic parcels post will be very thoroughly canvassed in the near future, and it may be expected that when the matter really takes shape it will be in the form of a recommendation for the establishment of an experimental service, such as was provided for by the so-called Denny bill, pending in the last Congress.

Postal Check Currency Project.

After renewing his recommendations for the consolidation of third and fourth class mail matter, Mr. Cortelyou gives considerable space to the discussion of the postal check currency scheme. This proposition has come to be fully understood by retailers in all lines as one for which the catalogue houses have been quietly working for several years. At least two of these big concerns have taken an active part in the movement, as was fully developed at the hearings before the House Post Office Committee last winter. The chief legislative problem which these concerns are trying to solve is, first, a simple method of obtaining the consumer's money; and, second, a cheap way of transporting their merchandise. A postal check currency system would solve the first feature of this problem, and the proposed consolidation project would reduce the merchandise postage one-half, which would save many hundred thousand dollars and no doubt stimulate the demand for a parcels post. Concerning the proposed postal note, Mr. Cortelyou says:

> The departmental committee appointed to consider and report upon the advisability of recommending legislation on the subject of a postal note or other substitute for postage stamps and coins in remittances of small amounts through the mails made their first report on March 31, 1906, in connection with which they submitted a draft of a bill. On April 24, 1906, copies of the bill were submitted to the chairman of the Committee on Post Offices and Post Roads, United States Senate, and to the chairman of the Committee on the Post Office and Post Roads, House of Representatives, the importance of early and favorable action thereon was urged, and the hope expressed that the measure would be passed at that session of Congress. This bill failed of Congressional action.
>
> Since rendering their first report the committee have visited the post office department at Ottawa, Canada, for the purpose of gaining a better knowledge of the working of the postal note system which has been successfully operated in that country since 1898.
>
> To a certain extent the proposed United States postal note is similar to the Canadian postal note. The rules governing the payment of postal notes may be made so flexible as to meet every ordinary contingency, and in the issuance of such postal notes no written application or advice is required. They may be procured almost as easily as our postage stamps. That the system is a success as administered in Canada and is largely used and appreciated is shown by the fact that the total value of notes paid has increased from $769,217.90 in 1899 to $4,698,935.40 in 1906. The system in Canada has proved to be entirely self-sustaining.
>
> On November 2, 1906, the committee submitted a supplemental report, stating therein that "further investigation has confirmed the opinion previously entertained and expressed that there is an undoubted demand on the part of the public for a postal note or some other substitute for postage stamps and coins in remittances of small amounts through the mails," and recommending that renewed efforts be made looking to the introduction and passage of the postal note bill by Congress at an early date. Concurring in that opinion, I approved the recommendation thus made by the committee.

Rural Parcels Post.

The Postmaster-General's recommendation of the so-called Bristow plan providing a species of rural parcels post is stated as follows:

> I recommend that provision be made for the carriage by rural carriers, at a fair rate of postage, of small parcels on rural routes, such privilege to be restricted in each case to the limits of the particular route on which the parcel originates, or, if found feasible, to all the routes emanating from a single post office.

While retail merchants might derive some benefit from the Bristow plan, it is regarded as open to two serious objections: 1, That it will afford a cheap method by which the big mail order houses may circulate their catalogues—sending them by freight to an agent at a distributing post office where they would be placed in the mails for delivery on the routes radiating therefrom; and, 2, that it would supply an entering wedge for a full fledged domestic parcels post. This latter view was entertained by the House Post Office Committee when it rejected the plan last winter.

An Interesting Statement in Regard to R. F. D. Service.

The Postmaster-General makes an announcement that will be read with gratification by retail merchants in all the districts where the wholesale extension of the rural free delivery service has resulted in important changes in trade channels, especially with respect to facilitating the competition of the mail order houses. The Postmaster-General says that hereafter great care will be exer-

cised in the establishment of additional routes, which must conform to the following rules:

1. That any rural route which shall be found, after careful inspection, not to yield results justifying the outlay, owing to lack of appreciation of the service, shall be discontinued, care being taken to restore any previously existing postal facilities which have been discontinued by reason of the establishment of rural delivery.

2. That where through sparsity of population or other causes the service, though appreciated, is found inordinately expensive, triweekly service shall be substituted for daily service until conditions improve.

3. That privileges unwisely granted to certain communities in the early days of the service of more than one delivery a day by rural carrier shall be gradually withdrawn, and that all rural service shall be restricted to one delivery and collection daily.

4. That all post offices, patrons of which can be adequately served by rural delivery, shall be discontinued upon the installation of rural service.

5. That on a standard route of 24 miles or more in length there must be a possible patronage of at least 100 families or a smaller proportionate number on routes of less length, and that three-fourths of the possible patrons shall be required to signify their intention to accept the service and provide boxes conforming to the department's requirements before the service is ordered.

6. That the roads to be traversed must be kept in good condition, unobstructed by gates, other than gates opening automatically, and that all unfordable streams must be bridged.

Rural Carriers, Their Salaries and Privileges.

In recommending an increase in the salaries of rural carriers the Postmaster-General called attention to the fact that Congress in the Appropriation act for the fiscal year 1904 provided that rural carriers "should not solicit business or receive orders for any person, firm or corporation, and should not during their hours of service carry any merchandise for hire except upon the request of patrons residing upon their respective routes." Prior to this the rural carriers had been explicitly authorized to perform services thus prohibited. The Postmaster-General then adds this significant statement, which he appends without comment:

In a circular letter of inquiry, issued by the Department September 26, 1897, to all postmasters from whose offices rural delivery has been established, these questions among others were propounded:

Has there been a perceptible increase in the delivery of newspapers in your district through the rural carriers? Has the general authorization given them to carry parcels, to receive subscriptions for newspapers, to receive and deliver telegrams (inclosed in a Government stamped envelope), and to perform other like services for patrons on their routes, been taken advantage of to any considerable extent?

The answers received from 93 postmasters in 34 States and Territories, embodied in the report of the Post Office Department for the fiscal year 1898, were generally to the effect that these privileges had been appreciated and had tended to popularize the service and increase the compensation of the carriers.

Whether this statement of the Postmaster-General's is an intimation that unless Congress will increase the salaries of rural carriers he will favor a return to the old system when carriers were the recognized agents of the big catalogue houses can only be surmised. At another place in the report he asserts that the carriers abused the privilege referred to, but it is obvious that the retail merchants of the country will consult their own interests by keeping a sharp eye on all developments in this connection, especially as the promoters of legislation favorable to the catalogue houses hope to have their schemes embodied in the Post Office Appropriation bill, which will have to be formulated and passed this winter in less than one-half the time usually occupied during a long session.

W. L. C.

OWING to the recent disastrous fire in Aberdeen, S. D., it will not be feasible for the South Dakota Retail Hardware Association to hold its second annual convention in that city, as determined. Accommodations have accordingly been secured in Mitchell, where the meeting will be held on February 12, 13 and 14. Hardware exhibits by manufacturers and jobbers will be a feature of the convention, as already announced in these columns, and those desiring to engage space should communicate with Noah Keller, Woonsocket, secretary of the association. A gazette will also be published in connection with the meeting, arrangements for securing advertising space in which should be made with E. D. Hawkins, Vermillion.

Letters from the Trade.

Our readers are invited to discuss in these columns questions of trade interest connected with the manufacture or sale of Hardware. We shall be pleased to have a free expression of opinion on subjects deserving the attention of Hardware merchants and manufacturers.

IN FAVOR OF MIXED PAINT.

FROM A HARDWARE HOUSE IN IOWA: Possibly the personal experience of one not a resident of a State where the "pure food law" is not stretched to cover Paints may not be uninteresting as pointing a moral and adorning a tale.

Years ago, in painting my new residence, I bought only best brand—and—White Lead, and what were sold to me as strictly first-class shade colors. As a first result I had a beautiful job, but next year everybody began to remark upon the uneven and uncertain color of my house. A half dozen painters interviewed me with their theory of the difficulty, with half a dozen dead sure solutions and remedies—"put on when work was damp," "poor shade colors," "not thoroughly mixed," &c.

I finally went to a painter in whose honesty and intelligence I had confidence, who also had a theory, which I quickly headed off by giving him *carte blanche* to get and put on as he pleased—to give me a job that wouldn't flake, spot or fade on a new addition then innocent of prime coat. The result was a twin brother to the other work.

I then turned the leaf square over. Bought what I thought a good, honest brand of Mixed Paint, used it with such a result then and thereafter as to make me a believer and champion of Ready Mixed Paints. Nor is my faith limited to one particular brand or manufacturer, as I have tried several good brands with uniform satisfaction.

FANCY PROFITS ON HARDWARE.

FROM A HARDWARE MERCHANT IN VIRGINIA: Referring to the article in a recent issue of *The Iron Age* in which the J. Stevens Arms & Tool Company discusses the subject of catalogue house competition, I just want to say that the author must have struck a regular high roller of a Hardware merchant in the New England town of Chicopee Falls, Mass., who charged him 25 cents for a 6-in. Damper and 35 cents for a four-piece Elbow. Right here in this small town in old Virginia, with only one line of railroad, I have for over 20 years sold the same articles at 10 and 15 cents, respectively. They are 10 cents each now. He talks about Gimlets at 10 cents. Well, I sell one now and then at 5 cents, which I claim is as cheap here as 3 cents in Chicago when you consider the difference in population.

REQUESTS FOR CATALOGUES, &c.

The trade is given an opportunity in this column to request from manufacturers price-lists, catalogues, quotations, &c., relating to general lines of goods.

REQUESTS for catalogues, price-lists, quotations, &c., have been received from the following houses, with whom manufacturers may desire to communicate:

FROM BAKER BROS., Andover, N. Y., who have lately succeeded P. C. Lynch in the general Hardware, House Furnishing, Agricultural Implement, Carriage and Wagon, Paint and Harness business.

FROM HARRIS PLUMBING COMPANY, Albany, Ga., which has decided to take up the sale of Hardware generally, and will value catalogues and quotations relating thereto.

MASSACHUSETTS SAW WORKS, Chicopee, Mass., manufacturer of Victor Hack Saw Blades, has secured the services of H. F. Strout as Eastern representative. Mr. Strout has been connected for several years with the Crucible Steel Company of America, having for the last few years had the management of its Springfield branch.

Correspondence.

A Defense of the North Dakota Paint Law.

To the Editor: In your issue of November 8th another Paint manufacturer goes into the subject of the Pure Paint Law of North Dakota. There are probably many readers of *The Iron Age* who do not know what this means and why the Paint Grinders' Association of the United States has been so busy the past two years in writing long articles on Paint mixing, and paying fancy prices to magazines for printing the same as reading matter when they are really "ads." only, and as such read nicely to the ordinary reader, who has no idea of Paint except as Lead and Oil mixed to cover some surface and give it a certain color. Recollect that these "ads." never appeared in the magazines until after our North Dakota law went into effect.

A Practical Law.

What the Pure Paint Law of North Dakota was intended to do it has done. This speaks volumes for any law passed by any legislative body. The intention was that the people of North Dakota should know what they are buying. When the label on a can of Paint reads that it is composed of pure Linseed Oil, pure carbonate of lead and zinc oxide, most purchasers believe that label tells the truth. But when by analysis it is found that 5 to 20 per cent. of the fluid is water, and another 5 to 20 per cent. is Gasoline or Naphtha, and with water free at every man's house, less the freight of 5 to 20 cents a gallon, and Gasoline costing from 8 to 20 cents a gallon at retail in any town, or one-fifth the price of Pure Linseed Oil, and when the same analysis also shows that the solid matter, instead of containing Lead or Zinc worth about 7 cents a pound, has 20 to 50 per cent. of dirt worth from ½ to 1½ cents a pound, and some Paint has neither Zinc or Lead of any quantity in it, then the people of North Dakota demanded what every State should have, a law which compels the factories to state *what* they are putting into their "gold bricks" called Paint.

The writer believes that the manufacturers got the "oil" fever from the Standard Oil Company and felt that anything was good enough for the people of the country so long as they would use it, pay the price and never kick. Contrary to the ideas of many Eastern people the people of North Dakota and the West are

Above the Average in Intelligence.

As is well known, the Eastern man is so slow that he never gets time or money to get very far from his birthplace. He will ask if St. Paul, Pierre or Helena is the capital of North Dakota, and the West means Indians to him. But the high, wise and mighty men of the National Paint Grinders' Association found a "Ladd" at the Government Experiment Station, Fargo, N. D., who told them where to head in and take the side track, for the majesty of the law was coming along on their track. Also a judge of the United States District Court, who informed them that they must obey the laws of this State if they continued to sell goods in this State.

Paint Manufacturers Inconsistent.

Just stop a moment and listen to some of the arguments made by their side of the case when before the court. They could not stand the extra expense of putting up a special Paint to comply with our law. But one very prominent maker afterward had *all* their Paint in this State returned to them by freight and replaced to every customer gallon for gallon free of all expense a Paint which would pass sale under our law. But here I wish to remind the reader that they did not do this until special visits of their paid men had been made to Fargo to see if Professor Ladd would not permit their Paint to remain on sale without any change in their label. He refused. They then ordered all their "strictly pure" Paint returned to them. In short, they could make Paint when they found they had to do so. The manufacturers also informed the United States Court that they could not print on their labels the ingredients of same, as that would give away their trade secrets. Let me say that the bulletins issued by Professor Ladd certainly

Gave Away Such Trade Secrets,

so much so that nearly every Paint dealer in North Dakota knows more than he used to about water, naphtha, barytes, &c., being necessary to make a strictly pure paint, worth, on account of the lies on the printed label, 10 cents a gallon more than any honest Paint. And said dealers refer to Bulletin 67 when a new Paint salesman strikes town.

All the people of North Dakota want is value received for their money, and they will get this from the manufacturers in the future. You know, out here we have that same enthusiasm which our former resident, President Roosevelt, has. It is in the climate, and

We Want a Square Deal

for every one, no special favors from any or to any. The letter in *The Iron Age* of November 8 started off and ended in a manner which reminds me of some horse races I have seen, where a horse would take the bit in his teeth and cover the entire mile *after* the bell had called his rider back.

Law Sets a Standard.

Our law does not say that manufacturers *must* put certain things in all Paint, but it does give a standard of what can be called pure Paint. If any maker wishes to mix 25 per cent. water, 40 per cent. gasoline, 35 per cent. Linseed Oil, and grind 40 per cent Barytes, 20 per cent. Silica, 10 per cent. Zinc Oxide and 30 per cent. Carbonate of Lead let him print this on his label. It will cost him no more for printing to put the truth on his label than a falsehood. He should also remember that both God and the common people hate a liar and a hypocrite. However, we believe that all the reputable manufacturers want to make their goods as represented by their ads. and printed matter, but the competition of unscrupulous factories has had the tendency to lower high standards. Most of the factories have complied with the law here since the United States Court decided against them, and in so doing proved that their test case in court was "only a bluff." We also believe that this law is

For the Advantage of Every Honest Maker,

as he then knows and can show by the label how a Paint selling for 25 cents a gallon less than his can be made at 35 cents a gallon less cost to the manufacturer of the cheaper Paint.

Regarding the latter part of your correspondent's letter, I believe it would be well for the writer of it to refresh his memory from a paper which the National Paint Grinders' Association had read by one of their hired men at the North Dakota Hardware Merchants' annual meeting, held in Grand Forks, N. D., last January. Then let him follow the above with a perusal of Ladd's Bulletins No. 67 and No. 70, and I think about the only honest conclusion he can possibly arrive at will be that 90 per cent. of the valuable researches made by the manufacturers in the past has been for their benefit in cheapening the quality and cost, and only 10 per cent. has been for the benefit of the consumer. We are the consumers and want this made 50 per cent. and 50 per cent., or equality, hence our North Dakota law. The readers of *The Iron Age* know that the tendency of most factories in all lines is to cheapen the quality of their goods as well as cheapen the cost of production by labor saving devices and thereby increase profits.

What the Paint Manufacturers Fear

more than our North Dakota law is the effect it has had and will have in other States. They don't want any similar laws passed by other States requiring them to bring their standards higher. If you doubt this statement try to have a law similar to ours passed by your State Legislature this winter and watch the result.

False Statements in Advertisements.

While on this subject there is another similar curse to the country that needs national legislation, and I refer to advertisements of all kinds. There should be a national law forbidding any false statement appearing on the label or advertisement of any article; also a penalty clause providing a fine for the first offense and a fine with imprisonment for the second offense. The same law should provide that the United States mails cannot carry any newspapers, periodicals, catalogues or magazines after the second conviction. In this way all-wool suits at $3 will be sold as "all shoddy cotton" suits at $3, and all-wool suits will sell at $20, as they should. Congress passed a good bill last session on pure foods. Let the good work go on, and let us educate the people to the fact that cheap prices mean cheap goods, and good goods at fair profits are the best and cheapest for every customer in the end. Always bear in mind that any honest law never hurt any honest man.

G. W. WOLBERT.

BISMARCK, N. D., December 1, 1906.

BUTTS & ORDWAY COMPANY has removed from 190 High street to 33 Purchase street, Boston, where it occupies a building, 50 x 80 ft., six floors and basement, affording more stockroom and increased office and shipping facilities. The company deals in Iron and Steel, Heavy Hardware and Blacksmiths' Supplies, and was established in 1888.

System for the Retailer.

Fourth Article.

PRICING AND SELLING.

BY JOHN A. MANSON, BURLINGTON, VT.

PRICING Hardware requires care and good judgment; some lines will stand a good profit, others a fair profit, and others but a very small profit. Local conditions govern the pricing of some lines, and it is a wise merchant who follows matters closely and prices his stock right, so that his store will be recognized as a place where goods are sold at legitimate prices and sales effected with uniformity and satisfaction. There should be one set of prices for retail trade, one set of prices for jobbing trade, and a rebate system for contractors. The contractor who is putting up a number of houses a year is entitled to different consideration than the person who is supplying the materials for the only house which he may be building in a lifetime. The trade of the contractor to-day is solicited by many manufacturers and jobbers who go direct to him regardless of the retailer. The progressive retailer will get after the contractor and show him wherein he can command his trade. For the convenience of the contractor, whose workmen may be getting goods at the Hardware store on which prices are wanted so that they can be charged out to the contractor's customers, and for the convenience of the Hardwareman whose clerk should be able to price the goods as they are selected, and furthermore, that the contractor's workmen or customers may not know just what the goods cost the contractor, it is certainly best to price the goods at regular retail prices and bill them out so at the end of the month, with a rebate slip attached to the bill.

Article	No. or Size	List	Discount	From	Fr'ght	Cost	Retail	Job
							Per 100	Per 100
Bolts-Common Carriage			50	A.S.&W. Mfg. Co. 1/1/06 Bald			⊞A	V□
	1/4 in	Retail	Retail	5/16 in	Retail	Retail	3/8 in	Retail	Retail	1/2 in	Retail	Retail
Length	Per 100	Per doz.	each	Per 100	Per doz.	each	Per 100	Per doz.	each	Per 100	Per doz.	each
1 in	1.00	⊥□	⊥	1.20	⊥I	I	1.60	⊥B	I			
1 1/4	1.04	"	"	1.25	"	"	1.68	"	"			
1 1/2	1.08	"	"	1.30	"	"	1.76	"	"			
1 3/4	1.12	"	"	1.35	⊥B	"						
2	1.16	⊥I	I	1.40	"	"	1.92	I□	"	2.00	C□	C
2 1/4	1.20	"	"	1.45	"	"						
2 1/2	1.24	"	"	1.50	⊥Δ	"	2.08	"	"	3.22	"	"
2 3/4	1.28	"	"									
3	1.32	⊥B	"	1.60	"	"	2.24	IB	C	3.44	CB	E
3 1/4	1.36	"	"									
4	1.40	"	"	1.70	"	"	2.40	"	"	3.66	"	"

Fig. 1.—Condensed Price-List of Carriage Bolts.

Article	No. or Size	List	Discount	From	Fr'ght	Cost	Retail	Job
		Per doz.					Per doz.	Per doz.
Butts-Wrot Steel	1 in	.40	40 & 10	S.&W. Mfg. Co. 1/1/06	Bald		IT T	V 80%
No 800 Narrow	1 1/4	.50	"	" "	"		⊥B "	from list
	1 1/2	.65	"	" "	"		⊥Δ "	"
	1 3/4	.80	"	" "	"		I□ C	"
	2	.90	"	" "	"		IB "	"
	2 1/4	1.05	"	" "	"		C□ "	"
	2 1/2	1.10	"	" "	"		CB E	"
	2 3/4	1.30	"	" "	"		E□ "	"
	3	1.45	"	" "	"		EB B	"
	3 1/2	2.10	"	" "	"		B□ ⊞	"
	4	2.85	"	" "	"		ΔB Δ	

Fig. 2.—Price-List of Wrought Steel Butts.

Article	No. or Size	List	Discount	From	Fr'ght	Cost	Retail	Job
							per lb	per lb
Cord-Cotton Sash	6			H.C.K. & Co. 7/9/06		70	CB	C□
Reel	7			F.O.B. Factory		70%	"	"
	8			Net 4% over cost		70	"	"
	9					"	"	"
	10					"	"	"
				Retail less than 100 ft. @			E□	

Fig. 3.—Price-List of Cotton Sash Cord.

Retail prices of all goods should be conveniently marked on sample boxes and price cards. The old-fashioned method of pricing original packages should be avoided. The matter of costs, concerns from whom the goods are purchased, dates of purchases, &c., and a complete copy of all retail prices should be kept in a price book, from which all invoices should be checked up and necessary particulars noted. Herein is illustrated some condensed pricing by which, with additional rulings, a number of items are priced in a comparatively small space. The standard list on each size is used in selling by the hundred at wholesale and retail, and with a variation in cost the hundred prices can be readily changed. As these goods bear a good profit by the dozen and singly, a moderate variation in cost need not affect the selling prices on them in these small quantities.

(To be continued.)

THAT the business of the retail catalogue houses is not suffering any diminution in volume is evident from the announcement recently issued by Montgomery Ward & Co., Chicago, that they have been obliged to stop sending out their catalogues for the remainder of the year. They state that orders have been so numerous this fall that they now have more business than they can handle in their present quarters, at least during the holiday rush. Next fall they hope to be in possession of a new and much larger establishment.

PRICE-LISTS, CIRCULARS, &c.

Manufacturers in Hardware and related lines are requested to send us copies of catalogues, price-lists, &c., for our catalogue department in New York; and at the same time to call attention to any new goods or additions to their lines, of which appropriate mention will be made, besides the brief reference to the catalogue or price-list in this column.

J. STEVENS ARMS AND TOOL COMPANY, Chicopee Falls, Mass.: Spanish abridged catalogue relating to Rifles, Target Pistols, Single and Double Barrel Shotguns, &c. Quantities of the catalogue will be furnished gratuitously imprinted with firm name and address, the transportation charges to be borne by consignee.

ADVANCE MFG. COMPANY, Racine, Wis.: Catalogue No. 2, devoted to Curry Combs, of which an extensive variety is illustrated.

N. F. THAYER & Co., 86 High street, Boston, Mass.: Price-list of Cut Soles, Top Lifts, Oak, Union and Hemlock Sole Leather.

ALFRED F. MOORE, Philadelphia, Pa.: Catalogue No. 16, of Insulated Electric Wire, Flexible Cords and Cables, with tables of approximate weight, resistance, diameter and area, &c.

NIAGARA FALLS METAL STAMPING WORKS, Niagara Falls, N. Y.: Illustrated catalogue and price-list No. 5, covering a line of Steel Harness Snaps, Breast, Rein and other Harness Chains, Picket Pins, Curry Combs, Swivels, &c.

RIXFORD MFG. COMPANY, East Highgate, Vt.: Hanger illustrating Axes, Hatchets and Scythes.

BORROWING TOOLS FROM THE STORE.

WE have already published several responses to the inquiry of a North Carolina Hardwareman which appeared in our issue 15th ult., asking the advice of his brother merchants as to a method by which he can keep track of and insure the return of tools loaned to his customers from the store. Other practical plans adopted by merchants who had in the past suffered from this annoying and more or less expensive imposition are described below. It is evident that the practice of loaning tools to customers is quite general, and that in some cases it is difficult to turn down the importunities of patrons. Under the circumstances it seems desirable for the merchant to adopt some plan by which he can make sure of the return of the borrowed article or be reimbursed for its value.

How They Do It in Oklohoma.

A Hardware house in Stillwater, Okla., writes as follows in regard to its method. It will be observed that a form of note (a reduced reproduction of which is given herewith) is used. This is said to fill the bill admirably, and the firm has not lost a borrowed tool in six months:

In your issue of November 15 we note query as to the best way of keeping track of tools loaned. We beg to say that no one knows the trouble and expense involved in this question better than the country Hardware merchant. In small towns the relationship between dealer and customer is closer than in large cities, and the dealer is imposed on to an extent that will hardly be credited, and the losses amount to a large sum each year through damage to tools borrowed by customers and of failure to return same. No matter how closely you may watch them, or, rather, think that you are watching them, tools disappear. When you pin down some man who has borrowed he always comes back at you with the statement that he returned them, and as you have no evidence to the contrary you are obliged to accept his statement or perhaps incur his ill will by doubting it.

When a man buys a piece of machinery it is a hard matter to refuse him tools to set it up, and notwithstanding his promise of immediate return it may be weeks or months before you see them again. He takes his own time and convenience, and the dealer will frequently find himself without Dies, Wrenches or other tools to carry on his own work with, and has either to do without or go and borrow from some one else.

To remedy the above troubles we devised the inclosed stub and receipt note, which is self-explanatory. If care is used in filling out both stub and receipt, and no tools are allowed to go out without such receipt being filled, the problem is solved. You would be surprised to see how promptly the tools come back and how anxious the borrower is to get his note. We tell our people it is done for the purpose of keeping a record of the tools, but that unless the note is taken up when tools are returned that we shall collect the paper. This compels promptness and avoids all unpleasantness. We have had only one man that has taken offense at our rule since we established it. Every one with this exception has signed willingly, and the result has been that we have not lost a tool in six months where time was taken to fill out the blanks.

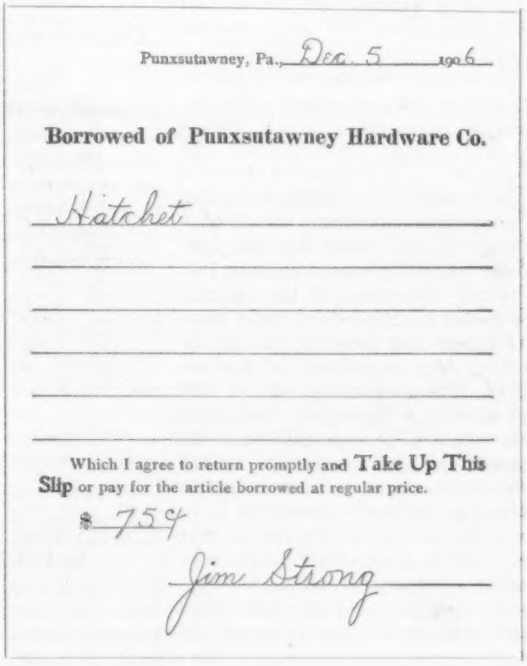
Pennsylvania House Uses a Slip.

Punxsutawney Hardware Company, Punxsutawney, Pa., employs the slip shown herewith for the purpose of securing the return of tools borrowed from its establishment. We understand that the plan gives entire satisfaction, and that the company experiences no trouble whatever from the loaning of tools to its customers. They either come back again promptly or the borrowers make good in cash equivalent.

See the Proprietor.

The following letter is from a large house in Mexico, which describes a method in which the proprietor largely figures. Tools are loaned only on direct appeal by customers to him, and as a result transactions of this character have almost ceased without creating any ill-feeling:

With reference to a communication from a North Carolina firm on the subject of tools loaned to customers, published in *The Iron Age*, November 15, beg to say that



Punxsutawney, Pa., Dec. 5 1906

Borrowed of Punxsutawney Hardware Co.

Hatchet

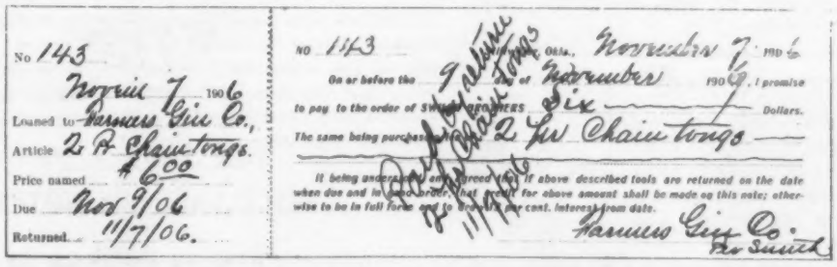
Which I agree to return promptly and **Take Up This Slip** or pay for the article borrowed at regular price.

$ 75¢

Jim Strong

Slip Employed by a Pennsylvania House.

we have found a very good cure for this difficulty. In a store with 15 employees it was found that the loss in tools and even material loaned to customers was large in spite of a rule requiring that all such loans should be charged as an ordinary sale and credited when returned. In one case a long Step Ladder was "lost" and only recovered by advertising for it. We then made a rule absolutely prohibiting clerks from loaning tools to any one, requiring parties who wanted such accommodation to go to the proprietor for an order. As the proprietor is less accessible to and less well acquainted with the individual customers, loans ceased almost entirely, and yet there were no feelings hurt.



No 143
November 7 1906
Loaned to Farmers Gin Co.,
Article 2 Pr Chain tongs.
Price named $6.00
Due Nov 9/06
Returned 11/7/06.

NO 143 Stillwater, Okla., November 7 1906
On or before the 9th day of November 1906, I promise
to pay to the order of SHERWOOD BROTHERS Six Dollars.
The same being purchase price of 2 Pr Chain tongs
It being understood and agreed that if above described tools are returned on the date when due and in good order, that credit for above amount shall be made on this note; otherwise to be in full force and to draw six per cent. interest from date.
Farmers Gin Co.
By Smith

Form of Note Used by Oklahoma House to Insure Return of or Payment for Tools Borrowed.

To make it easy for salesmen to convince customers that such a rule really existed and could not be departed from, a printed card was prominently posted in the store to the effect that

"Employees are not permitted to loan tools except upon a written order from the office."

As a further remedy, even the proprietor will not lend such things as Pipe Dies, which are often wanted. These go out for rental, or when that is not desirable, we offer to send a man to do such work as may be required and charge for the service as much as the man costs us in time, and an equal sum for the tool. We have not found that a single customer has been disgruntled by

these restrictions, and the direct advantage in money value was soon evident.

Charge Them Up to Monthly Account.

Another method is that of a Massachusetts firm, which charges the borrowed article to the man's account. The following letter tells how it works:

In *The Iron Age*, November 15, I noticed an article in regard to tools and such things that are continually being loaned by Hardware dealers and how to keep track of them. In our store we find the best way is to charge articles that are borrowed to a man's account, and when his bill is presented on the first of the month and he finds charged to him an article which has been borrowed he is pretty sure to return it or else pay for it. I think this is a pretty sure way to know what becomes of goods that are loaned.

TRADE ITEMS.

CHAS. J. FIELD'S SONS, Hardware merchants, formerly at 633 Market and 624 Commerce streets, Philadelphia, Pa., are temporarily occupying the building at 520 Commerce street. As the old building was found inadequate for the firm's increasing business, it has been decided to erect a more commodious fireproof building at 633 Market street. It is hoped in a few months to take possession of the new building.

J. L. EVANS has tendered his resignation as president of the Brown, Hinman & Huntington Company, Memphis, Tenn., taking effect December 10. Mr. Evans entered the service of the company in 1890 as bookkeeper, and soon thereafter was made secretary and superintendent, and given the management of the sales and manufacturing departments. He was elected treasurer of the American Fork & Hoe Company, Cleveland, upon its formation, and filled the position for one year, when, owing to the death of B. N. Huntington, he was transferred to the Brown, Hinman & Huntington Company as its president. His extended experience with the practical side of Hoe and Fork manufacturing has naturally brought him into close and pleasant contact with many of the leading Hardware jobbers and manufacturers of the country, who will doubtless be interested to learn that he has under contemplation the formation of a new corporation to engage in the same line of industry.

THE A. H. FOX GUN COMPANY, Philadelphia, having outgrown its plant at Wayne and Bristol streets, in that city, has purchased the plant and entire equipment of the Philadelphia Arms Company at Eighteenth and Windrim streets. The new plant, with the addition of the machinery equipment from its former plant, gives the company a capacity of 40 Guns per day, which will, however, be still further increased.

AMONG THE HARDWARE TRADE.

Wyman-Fraser Company has succeeded to the business of Wyman & Fraser, North Yakima, Wash. The lines carried include Agricultural Implements, Vehicles and Harness, which are accommodated in a new building having 15,500 sq. ft. of floor space.

Gumprecht Bros. & Co. have succeeded J. B. Hodge & Co. in Shelton, Neb., and will carry Shelf and Heavy Hardware, Stoves, Tinware, Sporting and Athletic Goods and General Merchandise.

C. S. Garrison has purchased the half interest of his brother, W. H. Garrison, in the firm of Garrison Bros., Hereford, Texas. The business will be continued under the name of Garrison Bros.

Proffitt, Moody & Rhymer, Custer City, Okla., have incorporated with a capital of $6000 to conduct a Hardware, Stove, Implement, Paint and Sporting Goods business.

G. R. Lyon & Sons, Waukegan, Ill., who handle Hardware, House Furnishing Goods, Woodenware, &c., in connection with a line of general merchandise, celebrated the sixty-third anniversary of the founding of the business on November 25. This is Waukegan's oldest commercial house. The business, which is a large and growing one, is now conducted by the son and grandsons of I. R. Lyon, the founder.

Morrison Hardware Company is about to open a retail Hardware store in Gate City, Va.

Akins & Rice, Joseph, Ore., have been succeeded in the Hardware, Stove, Implement, Paint and Sporting Goods business by H. D. Akins.

PRITCHARD-STRONG COMPANY'S LITHOGRAPH.

THE PRITCHARD-STRONG COMPANY, manufacturer of Lanterns and Hardware specialties, Rochester, N. Y., in the interest of its Prisco products is sending out a striking lithograph in 10 colors, substantially mounted on cardboard nearly ¼ in. thick, in which "Uncle Obediah" is represented in a characteristic attitude contemplating one of the company's Lanterns with evident pride and pleasure. The lithograph is life size and is provided

"Uncle Obediah" and His Lantern.

on the back with an arrangement for standing it in a nearly upright position. The color scheme was the work of the artist and magazine illustrator, Edward Penfield of New York City. The Lantern which is exploited in connection with the lithograph (being fastened to it with a tack driven into the hand, as shown herewith) is one of the latest Prisco products, a copper fount No. 2 cold blast Lantern, nickel plated. As an advertising device "Uncle Obediah" and his Lantern should prove interesting and effective.

MISCELLANEOUS NOTES.

Stay-on Blankets.

Burlington Blanket Company, Burlington, Wis., is putting on the market Safegert and Kuverall blankets, which fit the horse snugly and are not loose at one time and overtight at another. The give and take of a coil spring makes this possible. The point is made that the spring attachments will outwear the blanket. They insure against tight girthing, strains, tearing, ripping, shifting, &c. Another new device is a cattle cover, provided with elastic girths, placed so as to hold the cover firmly in position on the cow, covering the delicate milk veins and udder.

The Wallingford Mfg. Company.

The Wallingford Mfg. Company, Wallingford, Vt., is now making double the number of patterns of forks, hoes and rakes that the company put on the market last year. The manufacture of a full line of Southern steel goods has also been taken up, including planter, cotton and Blackland hoes, and the company refers to its line

of steel goods as now sufficiently complete to meet the requirements of any section of the United States.

Stevens Odorless Gun Oil.

The J. Stevens Arms & Tool Company, Chicopee Falls, Mass., is putting on the market 1 and 4-oz. bottles of gun oil, shown herewith. The oil is a lubricant, rust preventive, polishing and cleaning compound. The company guarantees it to be absolutely pure and to contain

Stevens Odorless Gun Oil.

no acid. It is especially adapted for use in connection with firearms, bicycles, sewing machines and all machines requiring a high grade of oil. The 1-oz. bottle is intended to retail at 10 cents, and the 4-oz. bottle at 25 cents.

The Victor Handy Bracket.

The Taplin Mfg. Company, New Britain, Conn., New York office, 155 Chambers street, is putting on the market the bracket shown in the accompanying cut, for holding Dover Egg Beaters of different sizes. The bracket is of

The Victor Handy Bracket.

such length that any receptacle from a tumbler to a 10-in. bowl can be used for mixing batter, omelets, &c., giving free use of both hands during the operation. The bracket is simple in construction and the point is made that the parts cannot be lost.

The Western Lawn Edger.

The Quimby Mfg. Company, Minneapolis, Minn., is offering the lawn edger shown in the accompanying illustrations. It is constructed on the plow principle and

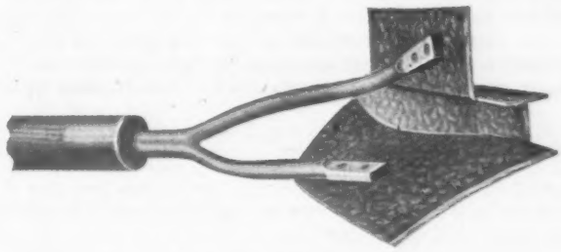


Fig. 1.—The Western Lawn Edger.

throws the turf outward onto the edge of the sidewalk, where it can be readily swept up, and not backward into the furrow, from which it would be removed with more

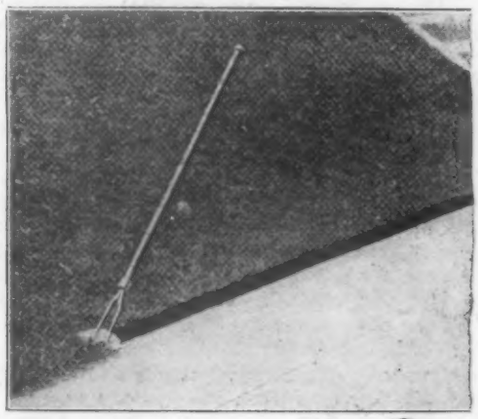


Fig. 2.—Operation of Western Lawn Edger.

or less difficulty. The edger is light and strong, made of one piece of steel, and can be operated as easily as a lawn mower. With the handle complete the edger weighs 2 lb.

No-Kum-Loose Drawer Knob.

To overcome the loosening of drawer knobs the Waddell Mfg. Company, Grand Rapids, Mich., has adopted the construction here illustrated. As shown in Fig. 1, a spurred nut is riveted to the knob, the spurs sinking into the drawer front, preventing the knob from turning. A spurred washer underneath the screw head likewise en-

Fig. 1.—Drawer Knob with Spurred Nut.

Fig. 2.—Veneered Face of Knob.

No-Kum-Loose Drawer Knob.

gages the inside of the drawer, perfecting a fastener which it is claimed will not come loose. The knobs are made of wood and handsomely finished, the one shown in Fig. 2 having a veneer face, that represented in Fig. 1 being perfectly plain. The knobs are furnished in 1, 1⅛, 1¼ and 2 in. sizes. The company also manufactures all wood casket handles, which are steel braced and have steel hinges, and which have been tested up to 300 lb. The handles are made of elm, and also of oak, birch and mahogany, the latter being given a fine, smooth finish.

The Motor High Speed Washing Machine.

The heavy flywheel on the top of the washing machine, shown in the accompanying cut, is started by a small amount of power imparted to the lever and keeps the machine in motion with little exertion on the part of the operator. The flywheel is on ball bearings and runs about 16 to one turn of the pin block inside the machine, thus imparting power and momentum to the dolly post attached to the pin block. The machine is offered by the Michigan Washing Machine Company, Muskegon, Mich., which guarantees it to wash clothes thoroughly.

The Motor High Speed Washing Machine.

Felt for Windows and Doors.

The accompanying cut illustrates one method of using the window felt which is just being placed upon the market by the firm of Williams & Paige, felt manufacturers, 68 Essex street, Boston, Mass. The felt is entirely different from any other which has been previously marketed as weather stripping, and in the opinion of the manufacturers and others much better for the general purpose of stopping all cracks and keeping out cold air. It also appeals to the public for the reason that it is sold in a package retailing at 10 cents. Goods are packed in cases containing ½ and 1 gross packages. Each package contains a strip of felt 1 in. wide and 72 in. long.

Felt for Windows and Doors.

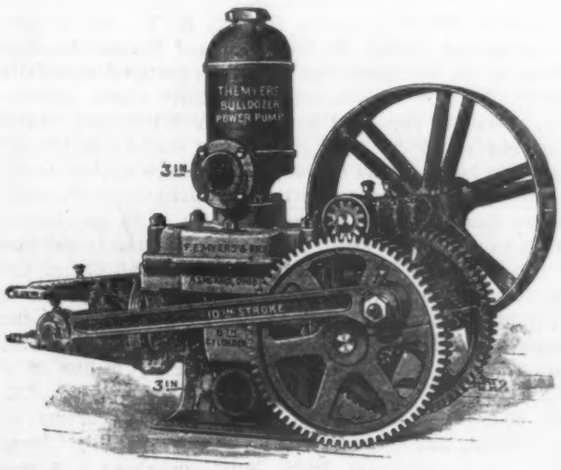
Buffalo Electric Blacksmith Blower No. 202.

Buffalo Forge Company, Buffalo, N. Y., has recently placed on the market the Electric Hand Blower No. 202, shown in the accompanying cut. It is designed especially for small shops, &c., on country circuits where the current cannot be depended upon with certainty and where, if an electric blower were installed, it would also be necessary to have a hand driven one to insure against emergencies. This machine comprises the manufacturer's well-known Buffalo Hand Blower No. 200, with an electric motor mounted on a small platform within the tripod legs of the machine. This places the motor in an out of the way yet readily accessible position. The fan spindle is continued through the dust proof oil case containing the gearing for the hand drive, and terminates in a small pulley which connects with the motor by means of a round belt. The motors usually supplied are either 104-volt 60-cycle induction type for alternating current or for 110-volt direct current and are attachable by "lamp cord" to an ordinary 16-cp. lamp socket as a source of power. If at any time it is desired to run the blower by hand, the belt is removed and the machine becomes at once an easy running, powerful blast blower. The power for the hand drive passes through only two sets of helical and spur-cut gears finished on special machines and running in an oil bath with the attendant minimum loss by friction. All bearings are bored and reamed in the solid metal, no liners being used. All machine work is done on jigs and parts are interchangeable. The outlet of the fan casing may be turned at any angle desired, and the gear and fan case are also adjustable as to hight. The blower is furnished with blast piping, air gate and the Buffalo No. HH side and center blast tuyere. The application of the electric driven hand blowers is not confined to forge fires, however, as they are suitable for use in systems for driving out smoke or fumes through piping where exhaust fans are not practicable, furnishing air at moderate pressures up to 3 or 4 oz. through short piping systems, &c. A feature of the outfit is the low cost as well as the small weight and consequent saving in freight charges.

Buffalo Electric Blacksmith Blower No. 202.

Myers Bulldozer Power Pump.

The accompanying cut represents a power pump, an addition to the line of F. E. Myers & Bro., Ashland, Ohio. It is built with a 6-in. brass lined cylinder and 10-in. stroke, and is mounted on one base. It is back geared 6 to 1 and has a maximum capacity of 5800 gal. per hour. The valve cap is held in position by six ¾-in. stud bolts,



Myers Bulldozer Power Pump.

by removing which the valves can be reached for repairs. Power is transmitted to the piston by two sets of gears, one on either end of the main shaft, thus increasing the strength. Complete specifications are as follows: Cylinder, formed by the main body of the pump, which is bored and lined with a heavy seamless drawn brass tube, 6 in. in diameter with a 10-in. stroke; valve seats, of the grid pattern; valves, hard rubber, 4½ in. in diameter, fitted with coil spring which assists in closing and also prevents slipping under heavy pressure; gears, double, with 2½-in. face and extra heavy teeth; piston rod, brass covered and driven from both sides, insuring perfect alignment; plunger, hemp packed; guide for piston rod, mounted direct on cylinder head, has bored ways for cross head; shafting, 1½ in. for belt pulley and 2 in. for gears; pulleys, 24 in. in diameter by 4-in. face; suction and discharge tapped for 3-in. pipe; speed not to exceed 40 strokes. The elevation against which this pump will operate is 150 ft. perpendicular or equal pressure when properly piped and not restricted. Each pump is tested in the factory under 140-lb. pressure. The pump is described by the manufacturers as being considerably heavier in construction throughout than the balance of their Bulldozer line, and especially designed for extremely heavy work.

Box Lighting Fixtures.

Cleveland Gas & Electric Fixture Company, Cleveland, Ohio, manufacturer of a general assortment of lighting fixtures, is putting out a line of fixtures packed complete in a special cardboard box, as shown in the accompanying cut. It is known as the C line, because the letter C is prefixed to all the numbers included, and is said to comprehend all requirements in low and medium priced fixtures. The feature of these fixtures, which are reasonable in price and noncomplex in construction, is the package idea. This facilitates handling, bringing all parts of each fixture together, so that they cannot be mixed up or lost, and keeping them clean and fresh until they are ready for installation. Thus they are especially adapted

Box Lighting Fixtures, One Unpacked, Showing Contents.

for carrying in stock, as they can be put upon the shelves and remain intact ready for use. The company is about completing a new factory which will be largely devoted to the manufacture of this new line.

PAINTS, OILS AND COLORS

Animal, Fish and Vegetable Oils—

	₱ gal.
Linseed, City, raw	.42 @43
City, Boiled	.43 @44
State and Western, raw	.41 @42
Raw Calcutta, in bbls	.70 @..
Lard, Extra Prime, Winter	.77 @78
Extra No. 1	.50 @51
No. 1	.44 @46
Cotton-seed, Crude, f.o.b. mills	@..
Summer Yellow, Prime	.41 @42
Summer White	@50
Sperm, Crude	.52 @53
Natural Winter	.65 @66
Bleached Winter	.68 @69
Bleached Winter, Extra	.70 @72
Tallow, Prime	.55 @56
Whale, Crude	.35 @36
Natural Winter	.45 @46
Bleached Winter	.47 @48
Extra Bleached Winter	.49 @50
Menhaden, Brown, Strained	.32 @36
Light, Strained	.32 @36
Northern	.28 @..
Southern	.27 @..
Cocoanut, Ceylon	₱ lb 8½@ 8¾
Cochin	₱ lb 9¾@..
Cod, Domestic, Prime	.30 @35
Newfoundland	.34½@42
Red, Elaine	.47 @49
Saponified	₱ lb 6½@ 6¾
Olive, Italian, bbls	.65 @68
Neatsfoot, Prime	.49 @50
Palm, Logos	₱ lb 7 @ 7½

Mineral Oils—

	₱ gal.
Black, 29 gravity, 25@30 cold test	10½@11½
29 gravity, 15 cold test	11½@12½
Summer	10½@11½
Cylinder, light filtered	.18 @19
Dark, filtered	.16 @17
Paraffine, 903-907 gravity	13½@14
903 gravity	12½@13
983 gravity	10¼@10¾
Red	12½@14

Miscellaneous—

Barytes:		
White, Foreign	₱ ton	$18.50@20.00
Amer. floated	₱ ton	19.00@.....
Off color	₱ ton	11.50@15.50
Chalk, in bulk	₱ ton	3.00@ 3.25
In bbls	₱ 100 lb	....@ .35
China Clay, English	₱ ton	11.00@17.00
Cobalt, Oxide	₱ 100 lb	2.50@ 2.60
Whiting, Commercial	₱ 100 lb	.43 @52
Gilders	₱ 100 lb	.50@ .55
Ex. Gilders	₱ 100 lb	.55@ .60

Putty, Commercial—₱ 100 lb

In bladders	$1.70 @1.85
In bbls. or tubs	1.20 @1.40
In 1 lb to 5 lb cans	2.65 @2.95
In 12½ to 50 lb cans	1.50 @1.90

Spirits Turpentine—₱ gal.

In Oil bbls	.70 @70½
In machine bbls	.70½@71

Glue—

	₱ lb
Cabinet	.11 @15
Common Bone	.. 7 @ 9
Extra White	.18 @24
Foot Stock, White	.11 @14
Foot Stock, Brown	.8 @11
German Hide	.12 @18
French	.10 @40
Irish	.13 @16
Low Grade	.9 @12
Medium White	.14 @17

Gum Shellac—

	₱ lb
Bleached Commercial	.47 @48
Bones, Dried	.57 @58
Button	.40 @50
Diamond I	.55 @56
Fine Orange	.52 @55
A. C. Garnet	.47 @49
Kala Button	.37 @38
G. A. L. Garnet	.45 @45½
D. C	.59 @60
Octagon B	@54
T. N	.48 @49
V. S. O	@55

Colors in Oil—

	₱ lb
Black, Lampblack	.12 @14
Blue, Chinese	.36 @46
Blue, Prussian	.32 @36
Blue, Ultramarine	.13 @16
Brown, Vandyke	.11 @14
Green, Chrome	.12 @16
Green, Paris	@24
Sienna, Raw	.12 @15
Sienna, Burnt	.12 @15
Umber, Raw	.11 @14
Umber, Burnt	.11 @14

White Lead, Zinc, &c.—

	₱ lb
Lead, American White:	
Lots of 500 lb or over, in Oil	@ 7
Lots less than 500 lb, in Oil	@ 7½
Dry in Barrels	@ 6½
Lead, English white, in Oil	9%@10
Lead, White, in oil, 25 lb tin pails, add to keg price	@ ⅛
Lead, White, in oil, 12½ lb tin pails, add to keg price	@ 1
Lead, White, in oil, 1 to 5 lb ass'ted tins, add to keg price	@ 1½
Lead, American, Terms: For lots 12 tons and over ¼¢ rebate; and 2% for cash if paid in 15 days from date of invoice; for lots of 500 lbs. and over 2% for cash if paid in 15 days from date of invoice, for lots of less than 500 lbs. net.	₱ lb
Zinc, American, dry	5%@ 5½
Zinc, French:	
Antwerp, Red Seal, dry	8%
Antwerp, Green Seal, dry	10%
Paris, Red Seal, dry	9%
Paris, Green Seal, dry	11
Zinc, V. M. French, in Poppy Oil:	
Green Seal:	
Lots of 1 ton and over	13¼@13%
Lots of less than 1 ton	13%@13%
Zinc, V. M. French, in Poppy Oil:	
Red Seal:	
Lots of 1 ton and over	11%@12%
Lots of less than 1 ton	12¼@12%

Discounts.—French Zinc.—Discounts to buyers of 10 bbl. lots of one or mixed grades 1%; 25 bbls., 2%; 50 bbls., 4%.

Dry Colors—

	₱ lb
Black, Carbon	6½@11
Black Dron, American	4 @ 6
Black Drop, English	5 @15
Black, Ivory	.16 @20
Lamp, Com	4 @ 6
Blue, Celestial	4 @ 6
Blue, Chinese	.29 @32
Blue, Prussian	.27 @30
Blue, Ultramarine	4½@15
Brown, Spanish	½@ 1
Carmine, No. 40	$3.00@3.05
Green, Chrome, ordinary	3½@ 6
Green, Chrome, pure	.17 @25
Lead, Red, bbls., ½ bbls. and kegs:	
Lots 500 lb or over	@ 7¼
Lots less than 500 lb	@ 7%
Litharge, American, bbls	7¼@ 7%
Ocher, American	₱ ton $8.50@16.00
American Golden	2½@ 3½
French	1¾@ 2½
Foreign Golden	3 @ 4
Orange Mineral, English	.10 @12
French	10¾@12
German	8¼@10
American	8½@ 8¾
Red, Indian, English	4½@ 8½
American	3 @ 3¼
Red, Turkey, English	4 @10
Red, Tuscan, English	7 @10
Red, Venetian, Amer.	₱ 100 lb $0.50@1.25
English	100 lb $1.15@1.75
Sienna, Italian, Burnt and Powdered	3 @ 9½
Italian, Raw, Powdered	3 @ 6½
American, Raw	1½@ 2
American Burnt and Pow'd.	1½@ 2
Talc, French	₱ ton $17.00@25.00
American	₱ ton 17.00@25.00
Terra Alba, French	₱ 100 lb .90@ 1.00
English	₱ 100 lb .80@ 1.00
American	₱ 100 lb, No. 1 .75@ .80
American	₱ 100 lb, No. 2 .60@ .65
Umber, Turkey, Bnt. & Pow.	2¼@ 3¼
Turkey, Raw and Powdered	2¼@ 3½
Burnt, American	1¼@ 2
Raw, American	1¼@ 2
Yellow, Chrome	.12 @14
Vermilion, American Lead	.16 @25
Quicksilver, bulk	.65 @..
Quicksilver, bags	@66
English, Imported	.65 @70
Chinese	$0.90@1.00

Current Hardware Prices.

General Goods.—In the following quotations General Goods—that is, those which are made by more than one manufacturer—are printed in *Italics*, and the prices named, unless otherwise stated, represent those current in the market as obtainable by the fair retail Hardware trade, whether from manufacturers or jobbers. Very small orders and broken packages often command higher prices, while lower prices are frequently given to larger buyers.

Special Goods.—Quotations printed in the ordinary type (Roman) relate to goods of particular manufacturers, who are responsible for their correctness. They usually represent the prices to the small trade, lower prices being obtainable by the fair retail trade, from manufacturers or jobbers.

Range of Prices.—A range of prices is indicated by means of the symbol @. Thus 33⅓ @ 33⅓ & 10% signifies that the price of the goods in question ranges from 33⅓ per cent. discount to 33⅓ and 10 per cent. discount.

Names of Manufacturers.—For the names and addresses of manufacturers see the advertising columns and also THE IRON AGE DIRECTORY, issued May, 1906, which gives a classified list of the products of our advertisers and thus serves as a DIRECTORY of the Iron, Hardware and Machinery trades.

Standard Lists.—A new edition of "Standard Hardware Lists" has been issued and contains the list prices of many leading goods.

Additions and Corrections.—The trade are requested to suggest any improvements with a view to rendering these quotations as correct and as useful as possible to Retail Hardware Merchants.

Adjusters, Blind—

Domestic, ℔ doz. $3.00.....33⅓%
North's 10%
Zimmerman's—See Fasteners, Blind.

Window Stop—

Ives' Patent.....35%
Taplin's Perfection.....35%

Ammunition—See *Caps, Cartridges, Shells, &c.*

Anti—Rattlers—

Fernald Mfg. Co. Burton Anti-Rattlers, ℔ doz. pairs, Nos. 1, $0.75; 2, $0.60; 4, $1.00; 5, $0.50.
Fernald Quick Shifter, ℔ doz. pairs .....$2.00@$3.00

Anvils—American—

Eagle Anvils.....℔ lb @8¼ ¢
Hay-Budden, Wrought.....9½@9¾ ¢
Trenton .....℔ lb 9½@9¾ ¢

Imported—

Peter Wright & Sons, ℔ lb, 84 to 340 lb, 11¢; 350 to 600 lb, 11½ ¢.

Anvil, Vise and Drill—

Millers Falls Co., $18.00.....15&10%

Apple Parers—See *Parers, Apple, &c.*

Aprons, Blacksmiths'—

Livingston Nail Co.....33⅓%

Augers and Bits—

Com. Double Spur.....75@75&10%
Jennings' Patn., reg. finish.....60&5@60&10%
Black Lip or Blued...65@65&5%
Boring Mach, Augers.....70&10%
Car Bits, 12-in. twist.....50&10%
Ford's Auger and Car Bits.....40&5%
Ft. Washington Auger Co., Conard's 35%
Forstner Pat. Auger Bits.....25%
C. E. Jennings & Co.:
No. 10 ext. lip R. Jennings' list..25%
No. 30, R. Jennings' list.....40&7½%
Russell Jennings' .....25&10&2½%
L'Hommedieu Car Bits.....15%
Mayhew's Countersink Bits.....45%
Pugh's Black.....35%
Pugh's Jennings' Pattern.....35%
Snell's Auger Bits.....60%
Snell's Bell Hangers' Bits.....60%
Snell's Car Bits, 12-in. twist.....60%
Snell's King Auger Bits.....50%
Wright's Jennings' Bits.....50%

Bit Stock Drills—

See *Drills, Twist.*

Expansive Bits—

Clark's small, $18; large, $26.....50&10%
Clark's Pattern, No. 1, ℔ doz. $26; No. 2, $18.....60&10&10%
Ford's, Clark's Pattern.....60%
C. E. Jennings & Co., Steer's Pat..25%
Lavigne Pat., small size, $18.00; large size, $26.00.....70&10%
Swan's 60%

Gimlet Bits—

Per gro.
Common Dble. Cut....$3.00@3.25
German Pattern, Nos. 1 to 10, $4.75; 11 to 18, $5.75

Hollow Augers—

Bonney Pat., per doz. ..$5.50@6.00
Ames .....25&10%
Universal 20%
Wood's Universal.....25%

Ship Augers and Bits—

Ship Augers.....45&5@—%
Ford's .....33⅓&5%
C. E. Jennings & Co.:
L'Hommedieu's 15%
Watrous' .....33⅓&7½%
Snell's 40%

Awl Hafts—See *Handles, Mechanics' Tool.*

Awls—

Brad Awls:
Handled .....gro. $2.75@3.00
Unhdld, Shldered...gro.63@66¢
Unhandled, Patent..gro.66@70¢
Peg Awls:
Unhandled, Patent..gro. 31@34¢
Unhdld, Shldered..gro. 65@70¢
Scratch Awls:
Handled, Com...gro. $3.50@4.00
Handled, Socket..gro.$11.50@12.00

Awl and Tool Sets—See *Sets, Awl and Tool.*

Axes—

Single Bit, base weights: Per doz.
First Quality.....$4.75@5.00
Second Quality.....$4.25@4.50
Double Bit, base weights:
First Quality.....$7.00@7.50
Second Quality.....$6.50@6.75

Axle Grease—

See *Grease, Axle*

Axles—

Iron or Steel
Concord, Loose Collar..4½@5 ¢
Concord, Solid Collar...4¾@5¼ ¢
No. 1 Common, Loose..3¾@4 ¢
No. 1½ Com., New Style3¾@4¼ ¢
No. 2 Solid Collar.....3¾@4¼ ¢
Half Patent:
Nos. 7, 8, 11 and 12....70@75%
Nos. 13 to 14.....70@75%
Nos. 15 to 18.....75@75&5%
Nos. 19 to 22.....75@75&5%

Boxes, Axle—

Common and Concord, not turned lb., 4½@5¢
Common and Concord, turned. lb., 5½@6¢
Half Patent.....lb., 9½@10¢

Bait—

Fishing—

Hendryx:
A Bait.....20%
B Bait.....25%
Competitor Bait.....20&5%

Balances—

Sash—

Caldwell new list.....50%
Pullman .....50&10@60%

Spring—

Spring Balances.....50&10@60%
Chatillon's:
Light Spg. Balances.....50&10%
Straight Balances.....40@50%
Circular Balances.....50&10%
Large Dial.....30%

Barb Wire—See *Wire, Barb.*

Bars—

Crow—

Steel Crowbars, 10 to 40 lb.... per lb., 3@3½¢

Towel—

No. 19 Ideal, Nickel Plate..℔ gro. $8.50

Beams, Scale—

Scale Beams.....40%
Chattillon's No. 1.....30%
Chattillon's No. 2.....40%

Bunters, Carpet—

Holt-Lyon Co.:
No. 13 Wire Tinned ℔ doz.....$0.75
No. 12 Wire Coppered ℔ doz, $0.75; Tinned $0.85
No. 11 Wire Coppered ℔ doz. $1.10; Tinned $1.20
No. 10 Wire Galvanized..℔ doz. $1.50
Western W. G. Co.:
No. 1 Electric.....℔ gro. $7.80
No. 2 Buffalo.....℔ gro. $9.00
No. 3 Perfection Dust.....℔ gro. $8.00

Egg—

Holt-Lyon Co.:
Holt, per doz., No. 5, $0.80; No. 1, Jap'd, $1.15; No. 1, Tin'd, $1.40; No. B, Jap'd, $1.85; No. 2, Tin'd, $2.25; No. 6, $1.60.
Lyon, Jap'd, per doz., No. 2, $1.35.
Taplin Mfg. Co.:
Improved Dover, per gro., No. 60, $6.00; No. 75, $6.50; No. 100, $7.00; No. 102, Tin'd, $8.50; No. 150, Hotel, $15.00; No. 152, Hotel Tin'd, $17.00; No. 200, Tumbler, $8.50; No. 202, Tumbler Tin'd, $9.50; No. 300, Mammoth, per doz., $25.00.
Turner & Seymour Mfg. Co.:
T. & S. Dover.....$6.00
Western, W. G. Co., ℔ gro., Buffalo, No. 2, $8.00; Perfection, No. 3, $9.00.
Wonder (E. M. Co.)..℔ gro. net, $6.25

Bellows—

Blacksmith, Standard List..
Split Leather.....65%
Grain Leather.....60%

Hand—

	Inch..	*6*	*7*	*8*	*9*	*10*
Net Prices.	*Doz...*	*$5.50*	*6.15*	*6.60*	*7.15*	*7.70*

Molders—

	Inch..	*9*	*10*	*11*	*12*	*14*
Net Prices.	*Doz...*	*$8.00*	*9.00*	*10.50*	*12.50*	*14.50*

Bells—

Cow—

Ordinary Goods...75&5@75&10&5%
High grade.....70&10@75%
Jersey .....75&10%
Texas Star.....50%

Door—

Abbe's Gong.....45%
Barton Gong.....50%
Home, R. & E. Mfg. Co.'s.....55&10%
Trip Gong.....50&10@50&10&5%
Yankee Gong.....55%

Hand—

Polished, Brass.....60&10%
White Metal.....60%
Nickel Plated.....50&10@60%
Swiss .....50&10@50&10&5%
Cone's Globe Hand Bells.....33⅓@35%
Silver Chime.....33⅓@35%

Miscellaneous—

Farm Bells.....lb., 2¼@2½¢
Church and School.....60%
Table Call Bells.....30@30&10%

Belting—Leather—

Extra Heavy, Short Lap..60&5%
Regular Short Lap....60&10&5%
Standard 70%
Light Standard.....70&5%
Cut Leather Lacing.....45%
Leather Lacing Sides, per sq. ft. 25¢

Rubber—

Agricultural (Low Grade)..... 75@75&5%
Common Standard....70@70&10%
Standard .....60&5@60&10%
Extra .....60@60&5%
High Grade.....50&5@50&10%

Bench Stops—

See *Stops, Bench*

Benders and Upsetters, Tire—

Detroit Perfected Tire Bender.....40%
Detroit Stoddard's Lightning Tire Upsetters, No. 1, $4.25; No. 2, $7.25; No. 3, $10.50; No. 4, $14.25; No. 5, $20.50.
Green River Tire Benders and Upsetters 20%

Bicycle Goods—

John S. Leng's Son & Co.'s 1906 list: Chain, Parts, Spokes.....50%
Tubes 60%

Bits—

Auger, Gimlet, Bit Stock Drills, &c.—See *Augers and Bits.*

Blocks—Tackle—

Common Wooden.....75%
Hartz St. Tackle Blocks.....50@50&5%
B. & L. B. Co.:
Boston Wood Snatch, 50%; Eclipse Steel, 75%; Hollow Steel, 50&10%; Star Wire Rope, 50%; Tarbox Metal Snatch, 50%; Tarbox New Style Steel, 50&10%; Wire Rope Snatch, 50%.
Lane's Patent Automatic Lock and Junior 30%
Stowell's Novelty, Mal. Iron.....50%
Stowell's Loading.....50&10%
See also Machines, Hoisting.

Boards, Stove—

Zinc, Crystal, &c.....40%
Paper Embossed.....40&10%

Boards, Wash—

See *Washboards.*

Bobs, Plumb—

Keuffel & Esser Co..... ..33⅓%

Bolts—

Carriage, Machine, &c.—

Common Carriage (cut thread): ⅝ × 6 and smaller..70&12½@—%
Larger and Longer..60&2½@—%
Phila. Eagle $3.00 list May 2, '99 40%
Bolt Ends.....65@65&5%
Machine, ⅝ x 4 and smaller.. 70&12½@—%
Machine, larger and longer.. 60&7½@—%

Door and Shutter—

Cast Iron Barrel, Japanned, Round Brass Knob:

Inch.....	*3*	*4*	*5*	*6*	*8*
Per doz..	*$0.30*	*.35*	*.45*	*.60*	*.80*

Cast Iron Spring Foot, Jap'd:

Inch.....	*6*	*8*	*10*
Per doz.....	*$1.20*	*1.50*	*2.25*

Cast Iron Chain, Flat, Japanned:

Inch.....	*6*	*8*	*10*
Per doz.....	*$1.00*	*1.40*	*1.65*

Cast Iron Flat Shutter, Jap'd., Brass Knobs:

Inch.....	*6*	*8*	*10*
Per doz.....	*$0.75*	*.95*	*1.25*

Wrought Barrel Japd..80@80&10%
Barrel Bronzed.....60&10%
Spring .....70&10@70&10&10%
Shutter .....50&5@50&10&5%
Square Neck.....75@75&10%
Square .....70&10&10%
Ives' Patent Door.....50%

Plow and Stove—

Plow .....65&10@—%
Stove .....85&10%

Tire—

Common Iron.....80%
Norway Iron.....80%
American Screw Company:
Norway Phila., list Oct. 16, '94...80%
Eagle Phila., list Oct. 16, '94....82½%
Bay State, list Dec. 28, '99.....80%
Franklin Moore Co.:
Norway Phila., list Oct. 16, '94...80%
Eagle Phila., list Oct. 16, '94....82½%
Eclipse, list Dec. 28, '99.....80%
Mount Carmel Bolt Co.:
Norway Phila., list Oct. 16, '94....80%
Eagle Phila., list Oct. 16, '94....82½%
Mount Carmel, list Dec. 28, '99...80%
Russell, Burdsall & Ward Bolt & Nut Co.:
Empire, list Dec. 28, '99.....80%
Norway Phila., list Oct., '94.....80%
Upson Nut Co.:
Tire Bolts.....72½%

Borers, Tap—

Borers Tap, Ring, with Handle:

Inch.....	*1¼*	*1½*	*1¾*	*2*
Per doz...	*$4.80*	*5.60*	*6.40*	*8.00*
Inch	*2¼*	*2½*		
Per doz.....	*$8.65*	*11.50*		

Enterprise Mfg. Co., No. 1, $1.25; No. 2, $1.75; No. 3, $2.50 each.....25%

Boxes, Mitre—

C. E. Jennings & Co.....30%
Langdon, New Langdon and Langdon Improved, 20&10%; Langdon Acme .....15&10%
Perfection 40%
Seavey 40%
Stanley R. & L. Co.: Nos. 240 to 460, 30%; Nos. 50 and 60.....35%

Braces—

Common Ball, American..$1.25@1.30
Barber's .....50&10&10@60&10%
Fray's Genuine Spofford's.....60%
Fray's No. 70 to 120, 81 to 123, 207 to 414 .....60%
C. E. Jennings & Co.....50&5%
Mayhew's Ratchet.....60%
Mayhew's Quick Action Hay Pat...50%
Millers Falls Drill Braces.....25&10%
P., S. & W. Co., Peck's Pat.60@60&5%
Stanley R. & L. Co.:
Stanley, 35%; Victor.....45%

Brackets—

Wrought Steel.....80@80&5%
Griffin's Pressed Steel.....75&10@80%
Griffin's Folding Brackets.....70&10%
Stowell's Cast Shelf, 75%; Sink...50%
Western, W. G. Co., Wire.....60&10%

Bright Wire Goods—

See *Wire and Wire Goods.*

Broilers—

Kilbourne Mfg. Co.....75&20%
Western, W. G. Co.....80%
Wire Goods Co.....75@75&10%

Buckets, Galvanized—

Price per dozen.

Quart.....	*10*	*12*	*14*
Water, Regular...	*1.40*	*1.70*	*1.90*
Water, Heavy....	*3.40*	*3.70*	*3.80*
Fire, Rd. Bottom..	*2.30*	*2.55*	*2.95*
Well	*2.55*	*2.87*	*3.15*

Bucks, Saw—

Hoosier.....℔ gro. $36.00

Bull Rings—See *Rings, Bull*

Butts—Brass—

Wrought, High List, Oct. 26, '06. 50%
Cast Brass, Tiebout's.....50%

Cast Iron—

Fast Joint, Broad....40&10@50%
Fast Joint, Narrow...40&10@50%
Loose Joint.....70&10@75%
Loose Pin.....70&10@75%
Mayer's Hinges.....70@70&5
Parliament Butts.....70@70&5

Wrought Steel—

	Discount.
Reversible and Broad..75%	
Light Reversible, Light Narrow 75%	Extra, 10&10@—
Loose Joint, Narrow, L'ht Inside Blind, etc.70&10%	
Back Flaps, Table, Chest 70%	

Cages, Bird—

Hendryx Brass: Series 3000, 5000, 1100, 10%; 1200, 25%; 200, 300, 600, 900 .....40%
Hendryx Bronze: Series 100, 800..40%
Hendryx Enameled.....40%

Calipers—See *Compasses.*

Calks, Toe and Heel—

Blunt, 1 prong.....per lb., 4@4¼¢
Sharp, 1 prong...per lb., 4½@4¾¢
Burke's Blunt, 4@4¼¢; Sharp, 4½@4¾¢
Gautier, Blunt, 4@4¼¢; Sharp, 4½@4¾¢
Perkins', Blunt, ℔ lb, 3.65¢; Sharp, 4.15¢

Can Openers—
See *Openers, Can.*

Cans, Milk—

	5	8	10 gal.	
Illinois Pattern.....	$1.35	1.85	2.05	each.
New York Pattern..	1.50	2.20	2.45	each.
Baltimore Pattern..	1.50	2.20	2.45	each.
Dubuque	1.35	1.60	1.75	each.

Cans, Oil—

Buffalo Family Oil Cans:

3	5	10 gal.
$18.00	60.00	129.60 gro., net.

Caps, Percussion—

Eley's E. B.....52@55¢
G. D.....per M 34@35¢
F. L.....per M 40@42¢
G. E.....per M 48@50¢
Musket .....per M 62@63¢

Primers—

Berdan Primers, $2 per M..20&5%
Primer Shells and Bullets..15&10%
All other primers per M.$1.52@1.60

Cartridges—

Blank Cartridges:
32 C. F., $5.50.....10&5%
38 C. F., $7.00.....10&5%
22 cal. Rim, $1.50.....10&5%
32 cal. Rim, $2.75.....10&5%
B. B. Caps, Con. Ball, Swgd.$1.90
B. B. Caps, Round Ball....$1.49
Central Fire.....25%
Target and Sporting Rifle..15&5%
Primed Shells and Bullets.15&10%
Rim Fire, Sporting.....50%
Rim Fire, Military.....15&5%

Casters—

Bed .....70@70&10%
Plate .....60&10@60&10&5%
Philadelphia .....75@75&10%
Acme, Ball Bearing.....33⅓%
Boss.....70&10%
Boss Anti-Friction.....70&10%
Gem (Roller Bearing).....80%
Martin's Patent (Phoenix).....45%
Standard Ball Bearing.....45%
Tucker's Patent low list.....30%
Yale (Double Wheel) low list.....50%

Cattle Leaders—
See *Leaders, Cattle.*

Chain, Coil—

American Coil, Straight Link:

3-16	¼	5-16	⅜	7-16	½	9-16
$8.90	6.10	5.10	4.40	4.25	4.15	4.10

⅝ ¾ ⅞ to 1 1-16 1⅛ to 1¼ inch.
$4.00 3.90 3.85 3.95
German Coil.....60&10&10@70%

Halter—

Halter Chains.....60&5@60&10%
German Pattern Halter Chains, list July 24, '97.....60&10&10%
Covert Mfg. Co.
Halter .....35&5%

Cow Ties—
See *Halters and Ties.*

Trace, Wagon, &c.—

Traces, Western Standard: 100 pr.
6½—6-3, Str'ght, with ring.$25.00
6½—6-2, Str'ght, with ring.$26.00
6½—8-2, Str'ght, with ring.$30.00
6½—10-2, Str'ght, with ring.$35.00

NOTE.—Add 2c per pair for Hooks. Twist Traces; add per pair for Nos. 2 and 3, 2c; No. 1, 3c; No. 0, 4c to price of Straight Link.

Eastern Standard Traces, Wagon Chain, &c.....60&10%

Miscellaneous—

Jack Chain, list July 10, '93:
Iron .....60&10%
Brass .....60&5%
Safety and Plumbers' Chain.70%
Gal. Pump Chain.....lb.4@4½¢
Covert Mfg. Co.:
Breast, Halter, Heel, Rein, Stallion 40%
Oneida Community:
Am. Dog Leads and Kennel Chains.....40@40&5%
Niagara Dog Leads and Kennel Chains .....45@60&5%
Wire Goods Co.:
Dog Chain.....70&10%
Universal Dbl.-Jointed Chain.....50%

Chain and Ribbon, Sash—

Oneida Community:
Copper Chain, 60&5%; Steel Chain, 60%
Pullman:
Bronze Chain, 60%; Steel Chain, 60&10%
Sash Chain Attachments, per set..8¢
Aluminoy Sash Ribbon, per 100 ft.....$1.25@$3.00
Sash Ribbon Attachments, per set..8¢

Chalk—(From Jobbers.)

Carpenters' Blue....gro., 50@55¢
Carpenters' Red.....gro., 45@50¢
Carpenters' White...gro., 40@45¢

Checks, Door—

Bardsley's 45%
Pullman, per gro.....$54.00
Russwin 33⅓%

Chests, Tool—

American Tool Chest Co.:
Boys' Chests, with Tools.....55%
Youths' Chests, with Tools.....60%
Gentlemen's Chests, with Tools..30%
Farmers', Carpenters,' etc., Chests, with Tools.....20%
Machinists' and Pipe Fitters' Chests, Empty.....50%
Tool Cabinets.....50%
C. E. Jennings & Co.'s Machinists' Tool Chests.....33⅓&10%

Chisels—

Socket Framing and Firmer

Standard List.....75@75&5%
Buck Bros.....30%
Charles Buck Edge Tool Co.....30%
C. E. Jennings & Co.:
Socket Firmer No. 10.....60%
Socket Framing No. 15.....60%
Swan's 75%
L. & I. J. White Co.....30@30&5%

Tanged—

Tanged Firmers.....40%
Buck Bros.....30%
Charles Buck Edge Tool Co.....30%
C. E. Jennings & Co. Nos. 191, 181..25%
L. & I. J. White Co.....25&5%

Cold—

lb.

Cold Chisels, good quality..13@15¢
Cold Chisels, fair quality..11@12¢
Cold Chisels, ordinary... 9@10¢

Chucks—

Almond Drill Chucks.....35%
Almond Turret Six-Tool Chuck.....40%
Beach Pat., each $8.00.....35&5%
Empire 25%
Blacksmiths' 25%
Jacobs' Drill Chucks.....35%
Pratt's Positive Drive.....25%
Skinner Patent Chucks:
Independent Lathe Chucks.....40%
Universal, Reversible Jaws.....40%
Combination, Reversible Jaws.....40%
Drill Chucks, New Model, 25%; Standard, 40&10%; Skinner Pat., 25%; Positive Drive.....40%
Planer Chucks.....30%
Face Plate Jaws.....40%
Standard Tool Co.:
Improved Drill Chuck.....40%
Union Mfg. Co.:
Combination, Nos. 1, 2, 3, 4, 5, 6, 7, 8 and 17, 40%; No. 21.....35%
Scroll Combination, Nos. 82 and 84 .....30%
Geared Scroll, Nos. 33, 34 and 35..30%
Independent Iron, Nos. 18 and 318.35%
Independent Steel, No. 64.....25%
Union Drill, Nos. 000, 00, 100, 101, 102, 103, 104.....35%
Union Czar Drill.....25%
Universal 11, 12, 16, 17, 13, 14, 15..35%
Universal, No. 42.....30%
Iron Face Plate Jaws, Nos. 28, 30, 48 and 50.....35%
Steel Face Plate Jaws, Nos. 70 and 72 .....30%
Westcott Patent Chucks:
Lathe Chucks.....50%
Little Giant Auxiliary Drill.....50%
Little Giant Double Grip Drill..50%
Little Giant Drill, Improved.....50%
Oneida Drill.....50%
Scroll Combination Lathe.....50%

Clamps—

Adjustable, Hammers'.....20@20&5%
Carriage Makers', P., S. & W. Co. .....40&10@50%
Bealy, Parallel.....33⅓&10%
Lineman's, Utica Drop Forge & Tool Co. 40%
Wood Workers, Hammers'.....40&10%
Saw Clamps, see Vises, Saw Filers'.

Cleaners, Drain—

Iwan's Champion, Adjustable.....55%
Iwan's Champion, Stationary.....45%

Sidewalk—

Star Socket, All Steel..℔ doz. $4.05 net
Star Shank, All Steel..℔ doz. $3.24 net
W. & C. Shank, All Steel, ℔ doz., 7½ in., $3.00; 8 in., $3.25.

Cleavers, Butchers'—

Foster Bros.....30%
Fayette R. Plumb.....30%
L. & I. J. White Co.....30%

Clippers, Horse and Sheep—

Chicago Flexible Shaft Company:
1902 Chicago Horse, each..$10.75
20th Century Horse, each..$5.00
Lightning Belt Horse, each.$15.00
Chicago Belt Horse, each.$20.00
Stewart's Enclosed Gear Horse, each.....$6.75
Stewart's Patent Sheep Shearing Machine, each.....$12.75
Stewart Enclosed Gear Shearing Machine, No. 8, each..$9.75
} 25 & 5

Clips, Axle—

Regular Styles, list July 1, '05.80%

Cloth and Netting, Wire—See *Wire, &c.*

Cocks, Brass—

Hardware list:
Plain Bibbs, Globe, Kerosene, Racking, Liquor, Bottling, &c. 70%
Compression Bibbs.....65&10%

Coffee Mills—

See *Mills, Coffee.*

Collars, Dog—

Nickel Chain, Walter B. Stevens & Son's list.....40%
Leather, Walter B. Stevens & Son's list 60%

Combs, Curry—

Metal Stamping Co.....40%

Compasses, Dividers, &c.

Ordinary Goods.....70&10@75%
Wm. Schollhorn Co.:
Excelsior Dividers.....55%
Lodi Dividers.....75%

Conductor Pipe,—

L. C. L. to Dealers:

	Galvanized		
	Galv. Steel.	*Charcoal Iron.*	*Copper. 14, 16&20 oz.*
Eastern:			
	60&30%	*60&2½%*	*30&10&2½%*
Central:			
	70%	*55&7½%*	*30&10%*
Western and Southern:			
	65&10%	*55&2½%*	*30&7½%*
So. Western			
	62½&7½%	*50&5%*	*30&5%*

Terms, 60 days; 2% cash 10 days. Factory shipments generally delivered.
See also Eave Troughs.

Coolers, Water—

Gal, each..	2	3	4	6	8
Labrador ...	$1.20	$1.50	$1.80	$2.10	$2.70
Gal.....	3	4	5	6	8
Iceland, ea..	$1.80	$2.10	$2.40	$3.00	
Gal.....	2	3	4	6	8
Galvanized, ea.	$1.85	$2.00	$2.25	$2.90	$3.90
Galvanized, Lined, side handles, Gal, ...	2	3	4	6	8
Each	$1.95	$2.15	$2.40	$3.30	$4.15

White Enameled, 25%; Agate Lined.25%

Coopers' Tools—
See *Tools, Coopers'.*

Coppers' Soldering—

Soldering Coppers, 3 lbs. to pair and heavier, 30@31¢; lighter than 3 lb. to pair.....32@33¢

Cord— Sash—

Braided, Drab.....lb. 35¢
Braided, White, Com., Nos. 8 to 12, 25¢; No. 7, 25½¢; No. 6, 26½¢.
Cable Laid Italian, lb., No. 18, 36¢
Italian, lb., A, No. 18, 25¢; B, 21¢
Common India.....lb. 10@10½¢
Cotton Sash Cord, Tw'ted. 17@19¢
Patent Russia.....lb...19¢
Cable Laid Russia.....lb...20¢
India Hemp, Br'd'd.....lb...20¢
India Hemp, Twisted..lb. 12@13¢
Patent India, Twisted...lb...16¢
Anniston Cordage Co.: ℔ lb, solid Braided, Nos. 8 to 12, $0.24; No. 7, $0.24½; No. 6, $0.25½; ℔ doz., 50 ft.; Oriole, $2.00; 50 ft., Columbia, $0.85; 50 ft., Victors, $1.00; 50 ft., 6-Thread, $1.10; 60 ft., 3-Thread, $0.95; 50 ft., Manila, $1.40; 60 ft., Jute, $0.75.
Pearl Braided, cotton, No. 6, ℔ lb, 25½¢; No. 7, 25¢; Nos. 8 to 12, 24½¢
Eddystone Braided, Nos. 8 to 10, 25¢; 7, 25½¢; 6, 26½¢.
Harmony Cable Laid Italian, Nos. 7 to 10.....℔ lb 23 ¢
Pullman:
Wire Sash Cord.....15%
Sash Cord Attachments, per doz..10¢
Samson, Nos. 8 to 12:
Braided, ℔ lb., Drab Cotton, 55¢; Italian Hemp, 40¢@50¢; Linen, 65¢; White Cotton, 50¢; Spot Cord.....50¢
Massachusetts, White....℔ lb 40¢
Massachusetts, Drab.....℔ lb 45¢
No. 7, 2¢; No. 6, 3¢.
Phoenix, White, Nos. 8 to 12, 27¢;
Silver Lake, per lb.:
A, Drab, 45¢; A, White, 40¢; B, Drab, 40¢; B, White, 35¢; Italian Hemp, 40¢; Linen....57½¢
See also Chain and Ribbon.
} 15&10%

Wire, Picture—

List July 10, 1906...85&10&10@—
Hendryx Standard Wire Picture Cord, old list, 85&10%

Cradles—

Grain .....40&12½%

Crayons—

White Round Crayons, Cases, 100 gro., $6.50@$7.50 at factory, but lower prices made by jobbers
Zelnicker's Lumber, ℔ gro.
White and Purple, Indelible....$7.50
Blue, Red, Green, Yellow and Terra Cotta, $6.50; Black.....$4.00
Genuine Soapstone, Metal Workers', 5 in. x ¾ in. Round, $2.50; 5 in. x ¾ in. Square, $1.75; 5 x ½ x 3-16, $2.50; 5 x 1⅛ x 3-16.....$3.00

Crooks, Shepherds'—

Fort Madison, per doz., Heavy, $7.00; Light $6.50

Crow Bars—See *Bars, Crow.*

Cultivators—

Victor Garden.....50%

Cutlery, Table—

International Silver Company:
No. 12 M'd'm Knives, 1847, ℔ doz. $3.50
Star, Eagle, Rogers & Hamilton and Anchor .....℔ doz. $3.00
Wm. Rogers & Son.....℔ doz. $2.50

Cutters— Glass—

H. H. Mayhew Co.....60%
Red Devil.....50%
Smith & Hemenway Co.....50%
Woodward 60%

Meat and Food—

American 30%

Nos.	401	402	403	404	405	406	407
Each ..	$5	$7	$10	$12	$25	$50	$60

Enterprise:

Nos.....	5	10	12	22	32
Each ..	$2	$3	$2.75	$4.50	$6

25@25&7½%
No. 202, $1.50.....40&7½%
Dixon's .....℔ doz. 30@30&5%

Nos.....	1	2	3	4
	$14.00	$17.00	$19.00	$30.00

Ideal .....40@40&5%
Little Giant.....℔ doz. 40@50%

Nos.....	305	310	312	320	322
	$35.00	$48.00	$44.00	$72.00	$66.00

N. E. Food Choppers.....35%
New Triumph No. 605, ℔ doz. $21.00.....40@50%
Russwin Food, No. 1, $24.00; No. 2, $27.00 .....45&10&10%
Woodruff's .....℔ doz. 30@30&5%

Nos.....	100	150
	$15.00	$18.00

Enterprise Beef Shavers.....25@30%

Slaw and Kraut—

Henry Disston & Sons:
Slaw and Kraut Cutters, Corn Graters, &c.....35%
J. M. Mast Mfg. Co.:
Slaw Cutters, 1 Knife....℔ doz. $3.00
Combined Slaw Cutter and Corn Grater .....℔ doz. $4.00
Tucker & Dorsey Mfg. Co.:
Kraut Cutters.....40%
Slaw Cutters, 1 Knife..℔ gr. $18@$20
Slaw Cutters, 2 Knife..℔ gr. $22@$36

Tobacco—

All Iron, Cheap..doz. $4.25@$4.50
Enterprise .....25@30%
National, ℔ doz., No. 1, $21; No. 2, $18 .....40%

Diggers, Post Hole, &c.—

Disston's:
Rapid, ℔ doz., $24.00.....25%
Samson, ℔ doz., $34.00.....25%
Iwan's Imp'ved Post Hole Auger.40&5%
Vaughan Pattern Post Hole Augers, ℔ doz., $6.25
Perfection Post Hole Diggers, ℔ doz. $8.75
Split Handle Post Hole Diggers, ℔ doz., $7.75
Kohler's, ℔ doz., Universal, $14.00; Little Giant, $12.00; Hercules, $10.00; Invincible, $9.00; Rival, $8.00; Pioneer.....$7.00
Never-Break Post Hole Diggers, ℔ doz., $24.00.....60%

Dividers—See *Compasses.*

Drawers, Money—

Tucker's Pat. Alarm Till No. 1, ℔ doz., $18; No. 2, $15; No. 3, $12; No. 4, $18.

Drawing Knives—
See *Knives, Drawing.*

Dressers, Emery Wheel—

Sterling Emery Wheel Dressers.....35%
Sterling Wheel Dresser Cutters.....35%

Drills and Drill Stocks—

Blacksmiths' Common Drilling Machines .....$1.50@$1.75
Breast, Millers Falls.....15&10
Breast, P., S. & W.....40%
Goodell Automatic Drills.50&10@60&10%
Johnson's Automatic Drills, Nos. 2 and 3.....16⅔%
Johnson's Drill Points.....16⅔%
Millers Falls Automatic Drills.33⅓&10%
Ratchet, Curtis & Curtis.....25%
Ratchet, Parker's.....40%
Ratchet, Weston's.....40%
Ratchet, Weston's, Style H Improved 40%
Ratchet, No. 912.....40%
Ratchet, Celebrated.....40%
Ratchet, Whitney's, P., S. & W..50%
Whitney's Hand Drill, No. 1, $10.00; Adjustable, No. 10, $12.00.....33⅓%

Twist Drills—

Bit Stock.....60&10&10@70%
Taper and Straight Shank.... 60&10@60&10&5%

Drivers, Screw—

Screw D'ver Bits, per doz..45@50¢
Balsey's Screw Holder and Driver, ℔ doz., 2½-in., $6; 4-in., $7.50; 6-in. ℔ 50%
Buck Bros.' Screw Driver Bits.....30%
Champion 50%
Disston's 70%
Edson 60%
Fray's Hol. H'dle Sets, No. 3, $12..50%
Ford's Brace Screw Drivers....40&10%
Gay's Double Action Ratchet.....35%
Goodell's Auto.....65@65&10%
Mayhew's Black Handle.....40%
Mayhew's Monarch.....40%
Millers Falls, Nos. 20 and 21....25&10%
Millers Falls, Nos. 11, 12, 41, 42..15&10%
New England Specialty Co.....30%
Smith & Hemenway Co., Newerturn, 40&5%; Elmora.....50%
H. D. Smith & Co.'s Perfect H'dle.40%
Stanley R. & L. Co.'s:
No. 64, Varn. Handles, 60&10%; No. 66, 70%; Defiance, 70%; Hurwood, 55%.
Swan's:
Nos. 7565 to 7568, 50%; No. 7540, 40&10%

Eave Trough, Galvanized—

Territory.	*L. C. L. Galvanized*		
	Galv. Steel.	*Charcoal Iron.*	*Copper. 14, 16&20 oz.*
Eastern:			
	80%	*70&5%*	*30&10&2½%*
Central:			
	75&10&7½%	*70%*	*30&10%*
Western and Southern:			
	70&20&7½%	*60&15&2½%*	*30&7½%*
So. Western:			
	70&20%	*65&2½%*	*30&5%*

Terms.—2% for cash. Factory shipments generally delivered.
See also Conductor Pipe and Elbows.

Elbows and Shoes—

Factory shipments, all territories:
Galv. Steel and Galv. C. I.
Standard Gauge.....60&10%
No. 26.....30%
No. 24.....25%
No. 22.....20%
Copper 50%

Elbows, Stove Pipe—

Edwards, Standard Blue.....40&10&10%
Edwards, Royal Blue.....40&10&10%
Dover, one piece (R. M. Co.).....40&10%
Perfect Elbows.....40%

Emery, Turkish—

	¼ to ½:	5/8 to 220:	Flour.
Kegs .....lb.	5 ¢	5½ ¢	3½ ¢
½ Kegs.....lb.	5½ ¢	5¾ ¢	3¾ ¢
¼ Kegs.....lb.	5½ ¢	6 ¢	4 ¢
10-lb. cans, 10 in case....	6½ ¢	7 ¢	6 ¢
10-lb. cans, less than 10.....	10 ¢	10 ¢	8 ¢
Less quantity..	10 ¢	20 ¢	8 ¢

NOTE.—In lots 1 to 3 tons a discount of 10% is given.

Extractors, Lemon Juice

Fasteners, Blind—See *Squeezers, Lemon.*

Zimmerman's ..... 50&10%
Waiting's ..... 40&10%

Cord and Weight—

Ives 33⅓%

Faucets—

Cork Lined ..... 50@50&10%
Metallic Key, Leather Lined .. 60&10@70%
Red Cedar ..... 40&10@50%
Petroleum ..... 70&10@75%
B. & L. B. Co.:
Metal Key ..... 60&10%
Star 60%
West Lock ..... 50&10%
John Sommer's Peerless Tin Key 40%
John Sommer's Boss Tin Key 50%
John Sommer's Victor Mtl. Key. 50&10%
John Sommer's Duplex Metal Key. 60%
John Sommer's Diamond Lock 40%
John Sommer's I.X.L. Cork Lined 50%
John Sommer's Reliable Cork Lined .. 50&10%
John Sommer's Chicago Cork Lined. 60%
John Sommer's O. K. Cork Lined 50%
John Sommer's No Brand, Cedar 50%
John Sommer's Perfection, Cedar 40%
McKenna, Brass:
Burglar Proof, N. P. 25%
Improved, ¾ and ⅞ inch 25%
Self Measuring:
Enterprise, ℔ doz. $36.00 ..... 40&10%
Lane's, ℔ doz. $36.00 ..... 40&10%
National Measuring, ℔ doz. $36. 40&10%

Felloe Plates—

See *Plates, Felloe.*

Files— Domestic—

List Nov. 1, 1899.
Best Brands ..... 70&10@75&10%
Standard Brands. 75&10@75&10&10%
Lower Grade .... 75&10&10@80&10%

Imported—

Stubs' Tapers, Stubs' list, July 24, '97 ..... 33 1-3@40%

Fixtures, Fire Door—

Richards Mfg. Co.:
Universal, No. 103; Special, No. 104 ..... $1.75
Fusible Links, No. 96 ..... 50%
Expansion Bolts, No. 107 ..... 60&10%

Grindstone—

Net Prices:

Inch	*15*	*17*	*19*	*21*
Per doz	$3.25	3.75	4.25	4.75

P., S. & W. Co. ..... 30&10%
Reading Hardware Co. 60%
Stowell's Giant Grindstone Hanger .. ℔ doz. $6.00
Stowell's Grindstone Fixtures, Extra Heavy, 40&10%; Light 50%

Fodder Squeezers—

See *Compressors.*

Forks—

NOTE.—Manufacturers are selling from the list of September 1, 1904, but many jobbers are still using list of August 1, 1899, or selling at net prices.

Iowa Dig-Ezy Potato ..... 60&10%
Victor, Hay ..... 60&15&2½%
Victor, Manure 60%
Victor, Header 60%
Champion, Hay 60%
Champion, Header 60%
Champion, Manure ..... 60&15&2½%
Columbia, Hay ..... 60&20%
Columbia, Manure 70%
Columbia, Spading ..... 70&12½%
Hawkeye Wood Barley 40%
W. & C. Potato Digger ..... 60&10%
Acme Hay ..... 60&20%
Acme Manure, 4 tine ..... 60&10&5%
Dakota Header ..... 60&20%
Jackson Steel Barley ..... 60&20%
Kansas Meader 65%
W. & C. Favorite Wood Barley 40%
Plated.—See Spoons.

Frames— Saw—

White, S'g't Bar, per doz. 75@80¢
Red, S'g't Bar, per doz. $1.00@1.25
Red, Dbl. Brace, per doz. $1.40@1.50

Freezers, Ice Cream—

Qt.	*1*	*2*	*3*	*4*	*6*
Each	$1.30	$1.60	$1.90	$2.20	$2.80

Fruit and Jelly Presses—

See *Presses, Fruit and Jelly.*

Fry Pans—See *Pans, Fry.*

Fuse— *Per 1000 Feet.*

Hemp $2.75
Cotton 3.20
Waterproof Sgl. Taped .. 3.65
Waterproof Dbl. Taped .. 4.40
Waterproof Tpl. Taped .. 5.15

10&5&2½%

Gates, Molasses and Oil—

Stebbins' Pattern ..... 80&10%

Gauges—

Marking, Mortise, &c. 50@50&10%
Chapin-Stephens Co.:
Marking, Mortise, &c. ..... 50&50&10%
Disston's Marking, Mortise, &c. 67½%
Stanley R. & L. Co.'s Butt and Rabbet Gauge 35%
Marking and Mortise 55%
Wire, Brown & Sharpe's 33⅓%
Wire, Morse's 35%
Wire, P., S. & W. Co. 30%

Gimlets— Single Cut—

Numbered assortments, per gro.

Nail, Metal, No. 1, $2.00; 2, $2.30
Spike, Metal, No. 1, $4.00; 2, $4.30
Nail, Wood Handled, No. 1, $2.30; 2, $2.60
Spike, Wood Handled, No. 1, $4.50; 2, $4.60

Glass, American Window

See *Trade Report.*

Glasses, Level—

Chapin-Stephens Co. ..... 60@60&10%

Glue, Liquid Fish—

Bottles or Cans, with Brush .. 25&10@50%
International Glue Co. (Martin's) .. 40%

Grease, Axle—

Common Grade .... *gro.* $4.50@6.00
Dixon's Everlasting, 10-lb pails, ea. 85¢; in boxes, ℔ doz., 1 lb, $1.20; 2 lb. $2.00
Helmet Hard Oil 25%

Griddles, Soapstone—

Pike Mfg. Co. ..... 33⅓@33⅓&10%

Grindstones—

Pike Mfg. Co.:
Improved Family Grindstones, ℔ inch, ℔ doz., $2.00 ..... 33⅓%
Royal Mfg. Co.:
Alundum Grinding Machines, each, Nos. 01, $1.75; 1A, $2.50; 10, $3.00 ..... 30%
Alundum Sickle Grinders, each, Nos. 20A, $6.00; 20A Combined, $6.50 ..... 30%
Alundum Disc Grinders, each, $2.50 ..... 30%

Grips, Nipple—

Perfect Nipple Grips ..... 40&10&2%

Halters and Ties—

Cow Ties ..... 60&10@60&10&5%
Covert Mfg. Co.:
Web ..... 30&2%
Jute Rope 35%
Sisal Rope 20%
Cotton Rope 45%
Hemp Rope 45%
Oneida Community:
Am. Coil and Halters ..... 40@40&5%
Am. Cow Ties ..... 45@50%
Niagara Coil and Halters .. 45@50&5%
Niagara Cow Ties .... 45&5@50&10&5%

Hammers—

Handled Hammers—

Heller's Machinists' ... 55&10@55&10&5%
Heller's Farriers' ..... 40&5@40&10&5%
Magnetic Tack, Nos. 1, 2, 3, $1.25, $1.50, $1.75 ..... 50%
Peck, Stow & Wilcox, Steel 50%
Fayette R. Plumb:
Plumb, A. E. Nail ..... 40&2½@40&12½%
Engineers' and B. S. Hand ..... 50&12½@60%
Machinists' Hammers ... 50&15@60&5%
Riveting and Tinners' ..... 40&2½@40&12½%

Heavy Hammers and Sledges—

Under 3 lb., per lb., 50¢.80&5@ .. ¢
3 to 5 lb., per lb., 40¢.80&5@ .. ¢
Over 5 lb., per lb., 30¢ .... 80&10&5@ .. ¢
Wilkinson's Smiths' ... lb. 9½@10¢

Handles—

Agricultural Tool Handles

Axe, Pick, &c. .... 60&10@60&10&5%
Hoe, Rake, &c. ..... 40@45&5%
Fork, Shovel, Spade, &c.:
Long Handles ..... 40@45&5%
D Handles 40%

Cross-Cut Saw Handles—

Atkins' 40%
Champion 50%
Disston's 50%

Mechanics' Tool Handles—

Auger, assorted ... *gro.* $2.50@$3.00
Brad Awl ..... *gro.* $1.65@$1.75
Chisel Handles, Ass'd, per gro.:
Tanged Firmer, Apple, $2.40@ $2.65; *Hickory* ..... $2.15@2.40
Socket Firming, Apple, $1.75@ $1.95; *Hickory* ..... $1.45@$1.60
Socket Framing, Hickory, $1.60@$1.75
File, assorted ..... *gro.* $1.30@$1.40
Hammer, Hatchet, &c. 60&10@60&10&5%
Hand Saw, Varnished, doz. 80&85¢; *Not Varnished* ... 65@75¢
Plane Handles:
Jack, doz. 80¢; *Jack, Bolted.* 75¢
Fore, doz. 45¢; *Fore, Bolted.* 90¢
Chapin-Stephens Co.:
Carving Tool ..... 40@40&10%
Chisel ..... 65@65&10%
File and Awl ..... 65@65&10%
Saw and Plane ..... 40@40&10%
Screw Driver ..... 40@40&10%
Millers Falls Adj. and Ratchet Auger Handles ..... 30&10%
Nicholson Simplicity File Handle .... ℔ gro. $0.85@$1.50

Hangers—

NOTE.—Barn Door Hangers are generally quoted per pair, without track, and Parlor Door Hangers per double set with track, &c.

Allith Mfg. Co.:
Reliable, No. 1; Allith, No. 3; Allith Adjustable, No. 6; Reliable Parlor Door 50%
Chicago Spring Butt Co.:
Friction 25%
Oscillating 25%
Big Twin 25%
Chisholm & Moore Mfg. Co.:
Baggage Car Door 50%
Elevator 30%
Railroad 50%
Cronk & Carrier Mfg. Co.:
Loose Axle ..... 60&10%
Roller Bearing 70%
Griffin Mfg. Co.:
Solid Axle, No. 10, $12.00 ..... 70%
Roller Bearing, No. 11, $15.00 70%
Roller Bearing, Ex. Hy., No. 22, $18.00 ..... 70%
Hinged Hangers, $16.00 .... 60&10%
Lane Bros. Co.:
Parlor, Ball Bearing, $4.00; Standard, $3.15; No. 105, $2.85; New Model, $2.80; New Champion $2.25
Barn Door, Standard ..... 60&5%
Hinged ..... net $6.08
Covered ..... 60&2%
Special ..... 70&5%
Lawrence Bros.:
Advance and Sterling .... 60&2½%
Cleveland and Peerless .. 70&7½%
Clipper, No. 75 ..... 60&5%
Crown ..... 60&2½%
Cyclone-Tandem ..... net $7.50
Easy Parlor Door, Dbl. Sets, $2.50; Single Sets, $1.25.
Giant 60%
Hummer ..... 70&7½%
New Cyclone, Flexible, $16.00 60
New York ..... 60&2½%
McKinney Mfg. Co.:
No. 1, Special, $15 ..... 60&10%
No. 2, Standard, $18 ..... 60&10%
Hinged Hangers, $16 ..... 50%
Meyers' Stayon Hangers ..... 60&5%
Richards Mfg. Co.:
Hangers, Nos. 47, 48, 147, 247, 60&5%
Pioneer Wood Track, No. 3 .. $2.25
Roller B'r'g St'l Track No. 12 $2.20
Roller B'r'g St'l Track No. 13 $2.50
Roller B'r'g, Nos. 39, 41, 43, 70&7½%
Hero, Adj. Track No. 19 .. 50&10%
Adjustable Track Tandem Trolley Track No. 16 ..... 50&10%
Seal, Steel Track No. 6 ..... $2.25
Auto Adj. Track No. 22 —50&5%
Trolley B. D. No. 17, $1.25; F. D. No. 129, $2.25; No. 121, $2.45; No. 150 ..... $2.50
Safety Underwriters F. D. No. 101 ..... 50%
Tandem No. 44, 2½ and 3 60&10%
Palace, Adjustable Track No. 132 ..... 50&5%
Royal, Adjustable Track No. 122 ..... 50&10%
Ives' Wood Track No. 1 ..... $2.25
Trolley B. D. No. 29 ..... 50&10%
Trolley B. D. No. 24, $1.30; No. 27, $1.40; No. 28 ..... $1.60
Roller Bearings, Nos. 37, 38, 39, 41, 43, 44, Sizes 1 and 2 .70&7½%
Anti-friction, No. 42; No. 44, sizes 2½ and 3 ..... 60%
Hinged Tandem No. 48 .... 60&5%
Folding Door B. B. Swivel No. 135 ..... 40%
Stowell Mfg. & Foundry Co.:
Acme Parlor Ball Bearing 30%
Ajax Hinge Door 60%
Apex Parlor Door ..... 50&10&5%
Atlas 60%
Baggage Car Door 50%
Climax Anti-Friction 50%
Elevator 40%
Express 50%
Lundy Parlor Door 50%
Matchless 60%
Nansen 70%
Parlor Door, 50&10%; Railroad, 50&10%
Steel, Nos. 300, 404, 500 ..... 50%
Underwriters' Fire Door 40%
Wild West Warehouse Door .. 50%
Wilbern, No. 0, net, ℔ doz. $9.00
Zenith for Wood Track 50%
A. L. Sweet Iron Works:
Check Back, 70%; Eagle 70%
Climax Anti-Friction ..... 50&10%
Hylo Hinge, New Perfection, Pilot, Pilot Hinge 60%
Rider Wooster 65%
Western Pattern 70%
Taylor & Boggis F'y Co.'s Kidder's Roller Bearing. 50&15&10&5%

Extra 50&10% often given.

Hangers— Garment—

Pullman Trouser, ℔ gro., 1 pair Flat Aluminoy, $9.00; 1 pair Round Nickeled, $9.80; 4 pair Round Nickeled, $27.00; 1 pair Flat Gun Metal, $12.00; 1 pair Flat Black Enamcied, $7.50; 1 pair Wood Clamp, $13.50; Skirt Hangers, Folding, per gro., $21.00; Coat Hangers, Folding, per gro., $8.00; Garment Hanger Rods, Round Nickeled, per gro. $10.50; Garment Hanger Loops, Round Nickeled, per gro. $10.50
Victor Folding ..... ℔ gro. $9.00
Western, W. G. Co. ..... 75&10%

Gate—

Myers' Patent Gate Hangers, ℔ doz. net $4.50

Joist and Timber—

Lane Bros. Co. 30%

Hasps—

Griffin's Security Hasp ..... 50&10%
McKinney's Perfect Hasp, ℔ doz. .50%

Hatchets—

Regular list, first quality 50%
Second quality $1.00 per doz. less than first quality.

Heaters, Carriage—

Clark, No. 5 $1.75; No. 5B, $2.00; No. 3, $2.25; No. 3D, $2.75; No. 7D, $3.00; No. 3E, $3.25; No. 1, $3.50 ..... 25%
Clark Coal, ℔ doz. $1.75 ..... 20%

Hinges—

Blind and Shutter Hinges—

Surface Gravity Locking Blind: (Victor; National; 1868 O. P.; Niagara; Clark's O. P.; Clark's Tip; Buffalo.)

No.	*1*	*1½*	*2*	*2½*
Doz. pair	$0.75	1.35	2.70	

Mortise Shutter: (L. & P., O. S., Dixie, &c.)

No.	*1*	*1½*	*2*	*2½*
Doz. pair	$0.70	.65	.60	.55

Mortise Reversible Shutter (Buffalo, &c.):

No.	*1*	*1½*	*2*
Doz. pair	$0.70	.65	.60

North's Automatic Blind Fixtures, No. 2, for Wood, $9.00; No. 3, for Brick, $11.50 ..... 10%
Charles Parker Co. ..... 70&75%
Parker Wire Goods Co.:
Hale & Benjamin Automatic Blind Hinges 20%
Hale's Blind Awning Hinges, No. 110, for wood, $9.00; No. 111, for brick, $9.00 ..... 20%
Reading's Gravity 60%
Stanley's Steel Gravity Blind Hinges, No. 1647½, ℔ doz. sets, without screws, $0.95; with screws, $1.25.
Wrightsville Hardware Co.:
O. S., Lull & Porter ..... 75&10&5%
Acme, Lull & Porter ..... 75&10%
Queen City Reversible ..... 75&10%
Shepard's Noiseless, Nos. 60, 65, 55 ..... 75&10%
Niagara, Gravity Locking, Nos. 1, 3 & 5 ..... 75&10&5%
1868, Old Pat'n, Nos. 1, 3 & 5 ..... 75&10&5%
Tip Pat'n, Nos. 1, 3 & 5 .. 75&10&5%
Buffalo Gravity Lockin Nos. 1, 3 & 5 ..... 75&10&5%
Shepard's Double Locking, Nos. 20 & 25 ..... 70%
Champion Gravity Locking, No. 75 75%
Steamboat Gravity Locking, No. 10 75%
Pioneer, Nos. 060, 45 & 5½ 75%
Empire, Nos. 101 & 103 ..... 70%
W. H. Co.'s Mortise Gravity Locking, No. 2 ..... 60%

Gate Hinges—

Clark's or Shepard's—Doz. sets:

No.	*1*	*2*	*3*
Hinges with L't'chs.	$2.00	2.70	5.00
Hinges only	1.40	2.05	3.80
Latches only	.70	.70	.35

New England:
With Latch ..... *doz.* ... @$2.00
Without Latch ... *doz.* ... @$1.60
Reversible Self-Closing:
With Latch ..... *doz.* ... @$1.75
Without Latch ... *doz.* ... @$1.35
Western:
With Latch ..... *doz.* $1.75
Without Latch ..... *doz.* $1.15
Wrightsville Hardware Co.:
Shepard's or Clark's, doz. sets.

Nos.	1	2	3
Hinges with Latches	$2.00	2.70	5.00
Hinges only	1.40	2.05	3.80
Latches only	.70	.70	1.35

Pivot Hinges

Bommer Bros. Pivot 40%
Lawson Mfg. Co. Matchless 50%

Spring Hinges—

Holdback, Cast Iron ... $6.50@$7.00
Non-Holdback, Cast Iron $6.25@$6.75
J. Bardsley:
Bardsley's Non-Checking Mortise Floor Hinges 40%
Bardsley's Patent Checking. 33⅓%
Bommer Bros.:
Bommer Ball Bearing Floor. 40%
Bommer Spring Hinges 40%
No. 999 Wrot. Steel Hold Back, ℔ gr. $9.00
Chicago Spring Butt Co.:
Chicago Spring Hinges 25%
Triple End Spring Hinges 50%
Chicago (Ball Bearing) Floor. 50%
Garden City Engine House 25%
Keene's Saloon Door 25%
Columbian Hardware Co.:
Acme, Wrought Steel 30%
Acme, Brass 25%
American 30%
Columbia, ℔ gr., No. 14, $9.00; No. 18, $25.00
Columbia, Adj., No. 7, ℔ gr. $12.00
Columbian Hinges ..... 60&10%
Gem, new list 30%
Clover Leaf ..... ℔ gr. $12.00
Oxford, new list 30%
Floor Spring Hinges ..... 65&10%
Lawson Mfg. Co. Matchless 30%
Richards Mfg. Co.:
Superior Double Acting Floor Hinges 40%
Shelby Spring Hinge Co.:
Buckeye All Steel Holdback Screen Door ..... ℔ gr. $9.00
Chief Ball Bearing Floor Hinge 50%
Ball Bearing Door 25%
No. 777, Sheet Steel Holdb'k, ℔ gr. pr. $9.00
Superior Spring Hinge Co.:
Superior Floor Hinges 33⅓%
The Stover Mfg. Co.:
Ideal, No. 16, Detachable, ℔ gr. $12.50
Ideal, No. 4, ℔ gr. $9.00
New Idea No. 1 ..... ℔ gr. $9.00
New Idea, Double Acting 50%
New Idea Floor 50%

Extra 10% often given on most of these Hinges.

Wrought Iron Hinges—

Strap and T Hinges, &c., list December 20, 1904:
Light Strap Hinges ... 65%
Heavy Strap Hinges .. 70%
Light T Hinges 60%
Heavy T Hinges 50%
Extra H'y T Hinges .. 66⅔%
Hinge Hasps 45%
Cor. Heavy Strap 70%
Cor. Ex. Heavy T .. 66⅔%

Extra, 10&5%

Screw Hook and Strap. { *6 to 12 in.* .lb. 3½¢ / *13 to 20 in.* .lb. 3½¢ / *22 to 36 in.* .lb. 3½¢

Screw Hook and Eye:
¾ to 1 inch.....lb. 6½¢
⅝-inch.....lb. 7½¢
½-inch.....lb. 8½¢

Hitchers, Stall—
Covert Mfg. Co., Stall Hitchers..30&2%

Hods— Coal—
	Per doz.			
Inch	14	15	16	18
Galv. Open	$2.50	2.75	3.00	3.25
Jap. Open	$1.90	2.10	2.25	2.55
Galv. Funnel	$3.00	3.30	3.60	3.90
Jap. Funnel	$2.45	2.65	2.85	3.30

Masons' Etc.—
Cleveland Wire Spring Co.:
Steel Brick, No. 163.....each $1.05
Steel Mortar, No. 158.....each $1.35

Hoes— Eye—
Scovil and Oval Pattern.....60&10@60&10&10%
Grub, list Feb. 23, 1899.....70&10@75&10%
D. & H. Scovil.....30%

Handled—
NOTE.—Manufacturers are selling from the list of September 1, 1904, but many jobbers are still using list of August 1, 1899, or selling at net prices.
Cronk's Weeding, No. 1, $2.75; No. 2, $2.50
Star Double Bit.....$3.20
Ft. Madison Cotton Hoe....10&10&10%
Ft. Madison Crescent Cultivator Hoe, ₱ doz.....10&10%
Ft. Madison Mattock Hoes:
Regular Weight.....₱ doz. 66⅔%
Junior Size.....₱ doz. $4.00
Ft. Madison Sprouting Hoe..₱ doz. 50%
Ft. Madison Dixie Tobacco Hoe.....75&10&7½%
Kretsinger's Cut Easy.....70&10%
Warren Hoe.....45&10%
W. & C. Ivanhoe.....75&2½
B. R. 6 in., Cultivator Hoe.....$3.15
B. B., 6¼ in.....$3.35
Acme Wedding.....₱ doz., net, $4.35
W. & C. L'tning Shuffle Hoe, ₱ doz.$4.85

Hoisting Apparatus—
See *Machines, Hoisting.*

Holders— Bit—
Angular, ₱ doz. $24.00.....45&10%

Door—
Bardsley's, Iron, 40%; Brass and Bronze.....33⅓%
Empire.....50%
Pullman.....35%
Superior.....33⅓%

File and Tool—
Nicholson File Holders and File Handles.....33⅓@40%

Fruit Jar—
Triumph Fruit Jar Holder, ₱ gross, $10.80; ₱ doz.....$1.25

Trace and Rein—
Fernald Double Trace Holder, ₱ doz. pairs.....$1.25
Dash Rein Holder, ₱ doz. pairs..$1.25

Hones—Razor—
Pike Mfg. Co., Belgian, German and Swaty.....50%

Hooks—Cast Iron—
Bird Cage, Reading.....40%
Clothes Line, Reading List.....40%
Clothes Line, Stowell's.....70%
Coat and Hat, Reading.....45&20%
Coat and Hat, Stowell's.....70%
Coat and Hat, Wrightsville.....65%
Harness, Reading List.....40%
Harness, Stowell's.....60%
School House, Stowell's.....70%

Wire—
Belt.....80&10@10...%
Wire C. & H. Hooks:.....75&10@75&10&10%
Columbian Hdw Co., Gem.....70&10%
Parker Wire Goods Co., King..70&10%
Western W. G. Co. Molding.....75%
Wire Goods Co.:
Acme, 60&10%; Chief, 70%; Crown, 75%; Czar, 65%; V Brace, 75%; Czar Harness, 50&10%.

Wrought Iron—
Box, 6 in., per doz., $1.90; 8 in., $1.25; 10 in., $3.50.
Cotton.....doz. $1.05@$1.25
Wrought Staples, Hooks, &c.—See Wrought Goods

Miscellaneous—
Hooks, Bench, see *Stops, Bench.*
Bush, Light, doz. $4.75; Medium, $5.35; Heavy, $6.25
Grass, best, all sizes, per doz.$1.60
Grass, common grades, all sizes, per doz......$1.30
Whiffletree.....lb. 5¾@4¢
Hooks and Eyes:
Brass.....60&5@60&10&5%
Malleable Iron.....70@70&10%
Covert Mfg. Co. Gate and Scuttle Hooks.....40%
Ft. Madison Cut-Easy Corn Hooks, ₱ doz. $3.25 net
Bench Hooks—See Bench Stops.
Corn Hooks—See Knives, Corn.

Horse Nails—
See *Nails, Horse.*

Horseshoes—
See *Shoes, Horses.*

Hose, Rubber—
Garden Hose, ¾-inch:
Competition.....ft. 5 @ 6 ¢
3-ply Guaranteed..ft. 8 @ 9 ¢
4-ply Guaranteed..ft. 10 @11 ¢
Cotton Garden, ¾-in., coupled:
Low Grade.....ft. 8 @ 9 ¢
Fair Quality.....ft. 10 @11 ¢

Irons— Sad—
From 4 to 10.....lb. 3 @3½¢
B. B. Sad Irons.....lb. 3¼@3½¢
Mrs. Potts', cents per set:
	Nos. 50	55	60	65
Jap'd Tops	65	62	75	72
Tin'd Tops	70	67	80	77

New England Pressing.lb. 3¾@4¢

Pinking—
Pinking Irons.....doz. 60¢

Irons, Soldering
See *Coppers.*

Jacks, Wagon—
Covert Mfg. Co.:
Auto Screw.....30&2%; Steel, 45%
Lockport.....50%
Lane's Steel.....30&10&2%
Richards' Tiger Steel, No. 130...50&10%
Smith & Hemenway Co.'s.....25%

Kettles—
Brass, Spun, Plain.....20@25%
Enameled and Cast Iron—See Ware, Hollow.

Knives—
Butcher, Kitchen, &c.—
Foster Bros.' Butcher, &c.....30%
Wilkinson Shear & Cutlery Co.....60%

Corn—
Wilkinson Shear & Cutlery Co.
Wilcut Brand Knives and Hooks.60%
Withington Acme, ₱ doz., $2.65; Dent, $2.75; Adj. Serrated, $2.20; Serrated, $2.10; Yankee No. 1, $1.50; Yankee No. 2, $1.15.

Drawing—
Standard List.....75&5@75&10%
C. E. Jennings & Co., Nos. 45, 46..60%
Jennings & Griffin, Nos. 41, 42....75%
Swan's.....70%
Watrous.....16⅔%
L. & I. J. White.....20&5@25%

Hay and Straw—
Serrated Edge, per doz.$5.75@6.00
Iwan's Sickle Edge.....₱ doz. $9.50
Iwan's Serrated.....₱ doz. $10.00

Mincing—
Buffalo.....₱ gro. $13.00

Miscellaneous—
Farriers'.....doz. $3.00@3.25
Wostenholm's.....₱ doz. $3.00@3.25

Knobs—
Base, 2½-inch, Birch, or Maple, Rubber Tip.....gro. $1.25@$1.40
Carriage, Jap., all sizes.....gro. 40@45¢
Door, Mineral.....doz. 65@70¢
Door, Por. Jap'd.....doz. 70@75¢
Door, Por. Nickel..doz. $2.05@2.15
Bardsley's Wood Door, Shutters, &c.15%

Lacing, Leather—
See *Belting, Leather—*

Ladders, Store, &c.—
Allith Mfg. Co., Reliable.....50%
Lane's Store.....25%
Myers' Noiseless Store Ladders....50%
Richards Mfg. Co.:
Improved Noiseless, No. 112.....50%
Climax Shelf, No. 113.....50%
Trolley, No. 109.....50%

Ladles, Melting—
L. & G. Mfg. Co. (low list).....25%
P. S. & W.....40&10%
Reading.....60%

Lanterns—Tubular—
Regular Tubular, No. 0.....doz. $4.25@4.50
Lift Tubular, No. 0.....doz. $4.75@5.00
Hinge Tubular, No. 0.....doz. $4.75@5.00
Other Styles.....40@40&5%

Bull's Eye Police—
No. 1, 2½-inch.....$2.75@3.00
No. 2, 3-inch.....$3.00@3.25

Lasts and Stands, Shoe—
Stowell's Atlas, Malleable Iron.....50%
Stowell's Badger, Cast Iron.....50%

Latches— Thumb—
Roggin's Latches, with screw..doz. 35@40¢

Door—
Allith Mfg. Co., Automatic, No. 400, ₱ doz.....$4.00
Cronk & Carrier Mfg. Co., No. 101, ₱ doz. $2.90
Cronk & Carrier Mfg. Co., Latch, Hasp and Staples.....50%
Richards' Bull Dog, Heavy, No. 125.....50&5%
Richards' Trump, No. 127.....$1.50
Stowell's Steel.....50%

Leaders, Cattle—
Small.....doz. 50¢; *large, 60¢*
Covert Mfg. Co.:
Cotton, 45%; Hemp, 45%; Jute, 35%; Sisal, 20%.

Lifters, Transom—
R. & E.....10%

Lines—
Wire Clothes, Nos.	18	19	20
100 feet	$2.25	2.00	1.75
75 feet	$1.75	1.55	1.10

Anniston Waterproof Clothes, 50 ft., ₱ gro. $25.00; Gilt Edge, $23.00; Air Line, $23.00; Acme, $18.00; Alabama, $17.00; Empire, $16.00; Advance, $14.00; Eclipse, $13.50; Chicago, $11.50; Standard, $10.50; Columbia, $9.50; Allston, $13.50; Calhoun, $12.00.
Samson Cordage Works:
Solid Braided Chalk, Nos. 0 to 3..40%
Solid Braided Masons'.....30%
Silver Lake Braided Chalk, No. 0, $6.00; No. 1, $6.50; No. 2, $7.00; No. 3, $7.50.....₱ gr. 20%
Masons' Lines, Shade Cord, &c.:
White Cotton, No 3½, $1.50; No. 4, $2.00; No. 4½, $2.50; Colors, No 3½, $1.75; No. 4, $2.25; No. 4½, $2.75; Linen, No. 3½, $2.50; No. 4, $3.50; No. 4½, $4.50.....20%
Tent and Awning Lines: No. 5, White Cotton, $7.50; Drab Cotton, $8.50.....20%
Clothes Lines, White Cotton: 50 ft., $2.75; 60 ft., $3.25; 70 ft., $3.75; 75 ft., $4.00; 80 ft., $4.25; 90 ft., $4.75; 100 ft., $5.25.....20%

Locks— Cabinet—
Cabinet Locks...33⅓@33⅓&7½%

Door Locks, Latches, &c.—
NOTE.—Net Prices are very often made on these goods.
Reading Hardware Co.....40%
R. & E. Mfg. Co.....10%

Elevator—
Stowell's.....50%

Padlocks—
Wrought Iron.....75@75&10%
Net prices are general.
R. & E. Mfg. Co. Wrought Steel and Brass.....75&10%

Sash, &c.—
Ives' Patent:
Bronze and Brass, 60%; Crescent, 40&20%; Iron, 60%; Window Ventilating, 55%; Robinson Pat. Ventilating Sash Lock, 33⅓%; Wrought Bronze and Brass, 55%; Wrought Steel, 55%.
Pullman Patent Ventilating Lock..35%
Reading.....40%

Machines—Boring—
Com. Upr't, without Augers, $2.00@2.25
Com. Angl'r, without Augers, $2.25@2.50
Swan's Improved.....40&10%
Jennings', Nos. 1 and 4.....33⅓%
Millers' Falls.....5.75
Snell's, Upright, $2.65; Angular, $2.90

Corking—
Reisinger Invincible Hand Power.... ₱ doz. $48.00

Fence—
Williams Fence Machines....each, $5.50

Hoisting—
Moore's Anti-Friction Differential Pulley Block.....30%
Moore's Hand Hoist, with Lock Brake.....20%
Moore's Cyclone High Speed Chain Hoist.....25%

Ice Cutting—
Chandler's.....12½%

Washing
Boss Washing Machine Co.:	Per doz.
Boss No. 1	$57.00
Boss Rotary	$57.00
Champion Rotary Banner No. 1	$57.00
Standard Champion No. 1	$50.00
Standard Perfection	$27.00
Cincinnati Square Western	$33.00
Uneeda American, Round	$33.60

Mallets—
Hickory.....45&5@50%
Lignumvitæ.....45&5@50%
Tinners' Hickory and Applewood.....doz. 45&5@50%

Mangers, Stable—
Swett Iron Works.....50%

Mashers, Vegetable—
Western, W. G. Co., Potato....60&10%

Mats, Door—
Elastic Steel (W. G. Co.), new list.50%
Keystone Wire Matting Co.:
Keystone.....50%
Ideal.....50%

Mattocks—
See *Picks and Mattocks.*

Milk Cans—See *Cans, Milk.*

Mills, Coffee, &c.—
Enterprise Mfg. Co.....20@25%
National list Jan. 1, 1902.....30%
Parker's Columbia & Victoria.50&10@60%
Parker's Box and Side.....50&10@60%
Swift, Lane Bros. Co.....30%

Motors Water—
Divine's Red Devil.....30%

Mowers, Lawn—
NOTE.—Net prices are generally quoted
Cheapest.....*all sizes, $1.85@2.00*
Cheap.....*all sizes, $2.00@2.50*
Better Grade..*all sizes, $2.50@4.50*

High Grade	12	14	16	18-in.
	$4.50	4.75	5.00	5.25

Continental.....60&5%
Great American.....70%
Great American Ball B'r'g, new list.70%
Quaker City.....70%
Pennsylvania.....60&5%
Pennsylvania, Jr., Ball Bearing....60%
Pennsylvania Golf.....50%
Pennsylvania Horse.....33⅓&5%
Pennsylvania Pony.....40&5%
Granite State:
Style A, Low Wheel.....70&10&10%
Style B, Low Wheel.....70&10%
Style C, High Wheel.....70&10%
Style D, High Wheel.....70%
Philadelphia:
Styles M., S., C., K., T....70&10&5%
Style A, all Steel.....60&10&5%
Style E, High Wheel.....70&10&5%
Drexel and Gold Coin, special list.40%

Nails—
Wire Nails and Brads, Miscellaneous.....85&10@85&10&5%
Cut and Wire. See *Trade Report.*
Hungarian, Finishing, Upholsterers' &c. See *Tacks.*

Horse—
Nos.	6	7	8	9	10	
Anchor	23	21	20	19	18	...40&5%
Champlain	28	26	25	24	23	.....50%
Coleman	13	12	12	11	11	.....net
New Haven	23	21	20	19	18	...40&5%
Livingston	19	18	17	16	16	.....10%

Western.....₱ lb 8½¢
Jobbers' Special Brands.....per lb. 9@10¢

Picture—
	1½	2	2½	3	in.
Brass H'd	.45	.55	.60	.70	.. gro
Por. Head	1.10	1.10	1.10	..	gro

Nippers—
See *Pliers and Nippers.*

Nuts—
Cold Punched: *Off list.*
Square, Blank or Tapped..4.80¢
Hexagon, Blank or Tapped..5.10¢
Square, Bl'k, C., T. & R....5.10¢
Hexagon, Bl'k, C., T. & R..5.70¢
Hot Pressed:
Square, Blank.....5.00¢
Hexagon, Blank.....5.40¢
Square, Tapped.....4.70¢
Hexagon, Tapped.....5.10¢

Oakum—
Best.....lb., 6½¢
U. S. Navy.....lb., 6¢
Navy.....lb., 5¢
Plumbers' Spun Oakum.....5½¢
In carload lots ½¢ lb. off, f.o.b. New York.

Oil Tanks—See *Tanks, Oil.*

Oilers—
Brass and Copper.....50&10%
Tin or Steel.....65&10&5@70%
Zinc.....65&10&5@70%
Chase or Paragon:
Brass and Copper.....50&10%
Tin or Steel.....65&10%
Zinc.....65&10%
Malleable, Hammers' Improved, Nos. 11, 12 and 13, 20%; Old Pattern, Nos. 1, 2, 3, 50%.
American Tube & Stamping Co.:
Spring Bottom Cans.....70@70&10%
Railroad Oilers, &c.....60@60&10%

Openers— Can— *Per doz.*
Sprague, Iron Handle....30@35¢
Sprague, Wood Handle...35@40¢
Sardine Scissors.....$1.75@$3.00
Vim Tin Shear and Can Opener, ₱ doz., 75c.; per gro., $7.50
Yankee Can and Bottle Opener, ₱ doz., net.....$0.75

Egg—
Nickel Plate, ₱ doz., $2.00; Silver Plate, $4.00.

Packing—
Asbestos Packing, Wick and Rope.....17@22¢

Rubber—
(*Fair quality goods.*)
Sheet, C. I......11@12¢
Sheet, C. O. S......11@12¢
Sheet, C. B. S......12@13¢
Sheet, Pure Gum.....40@45¢
Sheet, Red.....40@50¢
Jenkins' '96, ₱ lb, 80¢.....25%

Miscellaneous—
American Packing...lb. 7@10 ¢
Cotton Packing.....lb. 16@25 ¢
Italian Packing.....lb. 9@12½¢
Jute.....lb. 4@ 4½¢
Russia Packing.....lb. 8@11 ¢

Pails, Creamery—
R. M. Co., with gauges, ₱ doz., No. 1, $6.25; No. 2, $6.50.

Pails, Water, Well, &c.—
See *Buckets.*

Pans— Dripping—
Standard List.....65&7½%
Edwards, Royal Blue.....65&7½%

Fry—
Common Lipped:

Nos.	1	2	3	4	5
Per doz.	$0.75	0.80	0.90	1.10	1.30

Refrigerator, Galva.—

Inch	12	14	16	18
Per doz	$1.75	2.25	2.80	3.25

Roasting and Baking—
Regal, R. M. Co., ₱ doz., Nos. 5, $4.50; 10, $5.25; 20, $5.75; 30, $6.25.
Savory, ₱ doz., net, Nos. 200, $9.00; 400, $15.00.
Simplex, ₱ gro.:

No.	40	50	60	140	150	160
	$30.00	35.00	42.00	34.00	39.00	46.00

Paper—Building Paper
Asbestos: lb.
*Roll Board or Building Felt, 6 to 30 lb., per 100 sq. ft.*3½@5¢
Roll Board or Building Felt, 3-32 and ⅛ in., 45 to 60 lb., per 100 sq. ft......6¢
Mill Board, Sheet, 40 x 40 in., 1-32 to ½ in......3@5¢
Per roll
Rosin Sized Sheathing: 500 sq. ft.
Light weight, 25 lbs. to roll 40@50¢
Medium weight, 30 lbs. to roll, 50@55¢
Heavy weight, 40 lbs. to roll.. 65@70¢
Black Water Proof Sheathing, 500 sq. ft., 1 ply, 65¢; 2 ply, 85¢; 3 ply, $1.10; 4 ply, $1.25.
Deafening Felt, 9, 6 and 4½ sq. ft. to lb. ton.....$50.00
Red Rope Roofing, 250 sq. ft. per roll.....$1.75

Tarred Paper—
1 ply (roll 400 sq. ft.), ton.... $31.00@$35.00
2 ply, roll 108 sq. ft.....57¢
3 ply, roll 108 sq. ft.....80¢
Slater's Felt (roll 500 sq. ft.).76¢

Sand and Emery—
Flint Paper and Cloth.50&10@—%
Garnet Paper and Cloth....25%
Emery Paper and Cl'h..50&10@60%

Parers— Apple—
Advance	₱ doz.	$4.00
Baldwin	₱ doz.	$4.00
Bonanza Improved	each	$0.50
Daisy	₱ doz.	$4.00
Dandy	each	$7.50
Eureka Improved	each	$20.00
Family Bay State	₱ doz.	$15.00
Improved Bay State	₱ doz.	$36.00
Little Star	₱ doz.	$5.00
New Lightning	₱ doz.	$7.00
Reading 72	₱ doz.	$3.25
Reading 78	₱ doz.	$6.25
Rocking Table	₱ doz.	$6.25
Turn Table	₱ doz.	$6.00
White Mountain	₱ doz.	$5.00

Potato—
Saratoga ..... ₱ doz. $7.00
White Mountain ..... ₱ doz. $6.00

Picks and Mattocks—
List, Feb. 23, 1899 ..... 75@75&5%
Cronk's Handled Garden Mattock, ₱ doz., No. 2, $2.60; No. 3, $6.40.

Pinking Irons—
See *Irons, Pinking.*

Pins, Escutcheon—
Brass ..... 50&10@60%
Iron, list Nov. 11, '85 .. 60@60&10%

Pipe, Cast Iron Soil—
Carload lots.
Standard, 2-6 in. 50&10@50&10&5%
Extra Heavy, 2-6 in. ..... 65&10%
Fittings ..... 70&10@70&10&5%

Pipe, Merchant—
Consumers, Carloads.

	Steel. Blk.	Steel. Galv.	Iron. Blk.	Iron. Galv.
⅛ & ¼ in.	69%	53%	64.5%	48.5%
⅜ in.	71%	57%	64.5%	56.5%
½ in.	73%	61%	72.5%	62.5%
¾ to 6 in.	77%	67%	72.5%	62.5%
7 to 12 in.	72%	57%	68 %	53 %

Pipe, Vitrified Sewer—
Carload lots.
Standard Pipe and Fittings, 3 to 24 in., f.o.b. factory:
First-class ..... 85@86%
Second-class 90%
NOTE.—Market irregular.

Pipe, Stove—

Edwards' Nested:	Per 100 joints. C. L.	L. C. L.
5 in., Standard Blue	$6.25	$7.25
6 in., Standard Blue	6.75	7.75
7 in., Standard Blue	7.75	8.75
5 in., Royal Blue	7.00	8.00
6 in., Royal Blue	7.50	8.50
7 in., Royal Blue	8.50	9.50

Planes and Plane Irons—
Wood Planes—
Bench, first qual. .. 35@35&10%
Bench, second qual. .. 45@45&10%
Molding ..... 30@30&10%
Bailey's (Stanley R. & L. Co.) 35&2½%
Chapin-Stephens Co.:
Bench, First Quality 35%
Bench, Second Quality 45%
Molding and Miscellaneous 30%
Toy and German 35%
Unica 60%

Iron Planes—
Bailey's (Stanley R. & L. Co.) 35%
Chapin's Iron Planes ..... 50&10%
Miscellaneous Planes (Stanley R. & L. Co.) ..... 30&5%
Union 60%

Plane Irons—
Wood Bench Plane Ir s .... 25@25&10%
Buck Bros. 30%
Chapin-Stephens Co. 25%
Stanley R. & L. Co. 35%
Union 50%
L. & I. J. White ..... 20&5@25%

Planters, Corn, Hand—
Kohler's Eclipse ..... ₱ doz. $8.00

Plates—
Felloe ..... lb. 4@4¼¢
Self-Sealing Pie Plates (R. M. Co.), ₱ doz. $2.00 ..... 50%

Pliers and Nippers -
Button Pliers .... 75&10@75, 10, 5%
Gas Burner, per doz., 5 in., $1.25 @ $1.30; 6 in., $1.45 @ $1.50.
Gas Pipe ..

7	8	10	12-in.
$2.00	$2.25	$2.75	$3.50

Acme Nippers ..... 50&5%
Cronk & Carrier Mfg. Co.:
American Button ..... 75&10%
Cronk's 60%
Stub's Pattern 50%
Combination and others 33⅓%
Heller's Farriers' Nippers, Pincers and Tools ..... 40&5@40&10&5%
The Nettleton Mfg. Co. Reversible Cutting Nippers 40%
P., S. & W. Tinners' Cutting Nippers 40%
Wm. Schollhorn Co.:
Bernard, 33⅓%; Elm City, 33⅓%; Paragon, 50%; Lodi, 50%.
Swedish side, End and Diagonal Cutting Pliers 50%
Utica Drop Forge & Tool Co.:
Pliers and Nippers, all kinds 40%

Plumbs and Levels—
Chapin-Stephens Co.:
Plumbs and Levels ..... 30@30&10&5%
Chapin's Imp. Brass Cor. .. 40@40&10%
Pocket Levels ..... 30@30&10&5%
Extension Sights ..... 30@30&10&5%
Machinists' Levels ..... 40@40&10%
Disston's Plumbs and Levels 67½%
Disston's Pocket Levels 67½%
C. E. Jennings & Co.'s Iron 33⅓%
C. E. Jennings & Co.'s Iron, Adjustable ..... 40&7½%
Stanley R. & L. Co. 60%
Stanley's Duplex 30%
Woods' Extension 33⅓%

Poachers, Egg—
Buffalo Steam Egg Poachers, ₱ doz., No. 1, $6.00; No. 2, $9.00; No. 3, $9.00; No. 4, $12.00 ..... 60%

Points, Glaziers'—
Bulk and 1-lb. papers ..... lb. 10¢
½-lb. papers ..... lb. 9@10½¢
¼-lb. papers ..... lb. 9½@11¢

Pokes, Animal—
Ft. Madison Hawkeye ..... ₱ doz. $3.25
Ft. Madison Western ..... ₱ doz. $4.00

Police Goods—
Manufacturers' Lists .. 25@25&5%
Tower's 25%

Polish—Metal, Etc—
Glasbrite, No. 2, 5 lb can (powder), each, $1.25; ₱ doz., $12.00; No. 2, 10 lb can (cake), each, $2.50; ₱ doz., $24.00.
Prestoline Liquid, No. 1 (½ pt.), ₱ doz., $3.00; No. 2 (1 qu.), $9.00.. 40%
Prestoline Paste 40%
George William Hoffman:
U. S. Metal Polish Paste, 3 oz. boxes, ₱ doz. 50¢; ₱ gro. $4.50; ½ lb boxes, ₱ doz. $1.25; 1 lb boxes, ₱ doz. $2.25.
U. S. Liquid, 8 oz. cans, ₱ doz., $1.25.
Barkeepers' Friend Metal Polish, ₱ doz., $1.75.

Stove—
Black Eagle Benzine Paste, 5 lb cans, ₱ lb 10¢
Black Eagle, Liquid, ½ pt. cans.. ₱ doz. 75¢
Black Jack Paste, ¾ lb cans, ₱ gr. $9.00
Black Kid Paste, 5 lb can ..... each, $0.65
Ladd's Black Beauty Liquid, per 100 tins $6.75
Joseph Dixon's, ₱ gr. $5.75 ..... 10%
Dixon's Plumbago ..... ₱ lb 8¢
Fireside ..... ₱ gr. $2.50
Gem, ₱ gr. $4.50 ..... 10%
Japanese ..... ₱ gr. $3.50
Jet Black ..... ₱ gr. $3.50
Peerless Iron Enamel, 10 oz. cans.. ₱ doz. $1.50
Wynn's Black Silk:
Paste, cans, ₱ doz., 5 oz., $0.75; ½ lb, $1.00; 1 lb $1.75
Paste, ₱ 5 lb can $9.70
Liquid, cans, ₱ doz., 6 oz., $0.75; ½ pt., $1.00; 1 pt $1.75
Steel Range Enamel, ₱ doz., ¼ pt., $1.00; ½ pt., $1.25.

Poppers, Corn—
1 qt., Square ..... gro. $8.00
1 qt., Round ..... gro. $9.00
1½ qt., Square ..... gro. $10.00
2 qt., Square ..... gro. $12.00

Post Hole and Tree Augers and Diggers—
See also *Diggers, Post Hole, &c.*

Posts, Steel—
Steel Fence Posts, each, 5 ft., 42¢; 6 ft., 46¢; 6½ ft., 48¢.
Steel Hitching Posts ..... each $1.30

Potato Parers—
See *Parers, Potato.*

Pots, Glue—
Enameled ..... 30&10%
Tinned ..... 35&10%

Powder—
In Canisters:
Duck Shot lb ..... *each 45¢*
Fine Sporting, 1 lb .... *each 75¢*
Rifle, ½-lb ..... *each 15¢*
Rifle, 1-lb ..... *each 25¢*
In Kegs:
12½-lb. kegs *$3.50*
25-lb. keys *$4.50*
King's Semi-Smokeless:
Keg (25 lb bulk) $6.50
Half Keg (12½ lb bulk) $3.50
Quarter Keg (6¼ lb bulk) $1.90
Case 24 (1 lb cans bulk) $6.50
Half case (1 lb cans bulk) $4.50

King's Smokeless:	Shot Gun.	Rifle.
Keg (25 lb bulk)	$12.00	$15.00
Half Keg (12½ lb bulk)	6.25	7.75
Quarter Keg (6¼ lb bulk)	3.25	4.00
Case 24 (1 lb cans bulk)	14.00	17.00
Half case 12 (1 lb c. bk)	7.25	8.75

Robin Hood Sm'less Shot Gun .. 50&20%

Presses—
Fruit and Jelly—
Enterprise Mfg. Co. ..... 20@25%
Seal Presses—
Morrill's No. 1, ₱ doz., $20.00 ..... 50%
Pruning Hooks and Shears
See *Shears.*

Pullers, Nail—
Cyclops 50%
Miller's Falls, No. 3, ₱ doz., $12.00.. 33⅓&10%
Morrill's No. 1, Nail Puller, ₱ doz. $20.00 ..... 50%
Pearson No. 1, Cyclone Spike Puller, each $30.00 ..... 50%
Scranton, Case Lots:
No. 2B (large) $5.50
No. 3B (small) $5.00
Smith & Hemenway Co.:
Diamond B, case lots, ₱ doz., Large, $9.00; Small, $7.50.
Giant No. 1, ₱ doz., $18; No. 1½, $16.50; No. 3, $15 ..... 33⅓%
Staple Pullers, Utica and Davison 60%
Parrot Tack and Stub Puller, ₱ doz., 75c.: ₱ gro., $8.00

Pulleys, Single Wheel—

Inch	1½	1¾	2	3
Awning or Tackle, doz.	$0.30	.45	.60	1.05

Hay Fork, Swivel or Solid Eye. doz., ½ in., $1.25; 5 in., $1.55

Inch	2	2½	2½
Hot House, doz.	$0.65	.85	1.20
Inch	1¼	1½	1¾	2
Screw, doz.	$0.16	.19	.25	.30
Inch	1¾	2	2¼	2½
Side, doz.	$0.25	.40	.55	.60
Inch	1½	1¾	2	2½

Stowell's:
Ceiling or End, Anti-Friction .. 60&10%
Dumb Waiter, Anti-Friction .. 60&10%
Electric Light 60%
Side, Anti-Friction ..... 60&12½%

Sash Pulleys:
Common Frame; Square or Round End, per doz, 1¾ and 2 in. ..... *16@19¢*
Auger Mortise, no Face Plate, per doz., 1¾ and 2 in. .... *17@19¢*
Acme ..... 1¾ in., 16¢; 2 in., 19¢
Fox-All-Steel, Nos. 3 and 7, 2 in.... ₱ doz. 50%
Grand Rapids All Steel Noiseless .. 50%
Ideal ..... 70&5%
Niagara ..... 1¾ in., 16¢; 2 in., 19¢
No. 26, Troy .. 1¾ in., 14½¢; 2 in., 16½¢
Star ..... 1¾ in., 16¢; 2 in., 19¢
Tackle Blocks—See Blocks.

Pumps—
Cistern 60%
Pitcher Spout ..... 75&5@75&10%
Wood Pumps, Tubing, &c. 45@50%
Barnes Dbl. Acting (low list) 50%
Barnes' Pitcher Spout ..... 75&10&5%
Contractors' Rubber Diaphragm No. 2, B. & L. Block Co. $16.00
Daisy Spray Pump ..... ₱ doz. $6.50
Flint & Walling's, Fast Mail Hand, (low list) 55%
Flint & Walling's Fast Mail (low list) 55%
Flint & Walling's Tight Top Pitcher. 75&10&5%
National Specialty Mfg. Co., Measuring, Nos. 2, $6.00; 3, $5.50 ..... 30%
Myers' Pumps (low list) 50%
Myers' Power Pumps 50%
Myers' Spray Pumps 50%

Pump Leathers—
Plunger and Lower Valve—Per gro.:

Inch	2	2¼	2½	2¾
	$2.20	2.50	2.75	3.00
Inch	3	3¼	3½	3¾	4
	$3.30	3.60	3.85	4.10	4.40

Plunger Cup Leathers—Per 100:

Inch	2½	3	3½	4
	$2.75	3.85	5.00	6.00

Punches—
Saddlers' or Drive, good ..... *doz. 50@75¢*
Spring, single tube, good quality ..... *$1.75@2.00*
Revolving (4 tubes) ..... *doz. $3.50@3.75*
Bemis & Call Co.'s Cast St'l Drive .. 50%
Morrill's Nos. 1AA, 1A, 1B, 1C, $15.00 ..... 50%
Hercules, 1 die, each $5.00 ..... 50%
Niagara Hollow Punches 40%
Niagara Solid Punches ..... 55&10%
Wm. Schollhorn Co.:
Belt and Ticket, Bernard, 33⅓%; Paragon, 50%; Lodi 50%
Tinners' Hollow, P., S. & W. Co. 33⅓%
Tinners' Solid, P., S. & W. Co., ₱ doz., $1.44 ..... 50%

Rail—Barn Door, &c.—
Sliding Door, Painted Iron .... 2½@2¾¢
Sliding Door, Wrought Brass, 1½ in., lb., 30¢ 30%
Allith Mfg. Co.: Reliable Hanger Track 50%
Cronk's:
Double Braced Steel Rail .. ₱ ft. 2¾ c
O. N. T. Rail ..... 2½ ¢
Griffin's:
xxx, ₱ 100 ft., 1 x 3-16 in., $3.00; 1¼ x 3-16 in., 3.50.
Hinged Hanger, ₱ 100 ft., 1 x 3-16 in., $3.10; 1¼ x 3-16 in., $3.80.
Lane's:
Hinged Track, ₱ 100 ft., 1 in., $3.40; 1¼ in., $3.96.
O. N. T., ₱ 100 ft., 1 in., $3.00; 1¼ in., $3.60; 1½ in., $4.00.
Standard, 1¾ in. ..... ₱ 100 ft. $4.00
Lawrence Bros.:
₱ 100 ft. No. 201, $4.00; No. 202, $4.00
New York, 1 x 3-16 in., ₱ 100 ft. $3.00
McKinney's:
Hinged Hanger Rail, ₱ ft., 11¢ .. 50%
None Better ..... ₱ ft. 3¾ ¢
Standard ..... ₱ ft. 4 ¢
Myers' Stayon Track ..... 60&10%
Richards' Mfg. Co.:
Common, 1 x 3-6 in., $3.00; 1¼ x 3-16, $3.25; 1¼ x 3-16, $3.50.
Special Hinged Hanger Rail .. 60&10%
Lag Screw Rail, No. 65 ..... 50%
Gauge Trolley Track, ₱ ft., No. 31, 9c; No. 32, 14¢; No. 33, 20¢ .. 60&10%
No. 50 .....
Nos. 61, $3.00; 62, $3.25; 63, $3.50; 64, $4.00; 45, $3.25; 46, $3.50; 49, No. 1, $3.25; 49, No. 2, $3.50.
Stowell's:
Cast Rail ..... ₱ ft. 2¼ ¢
Steel Rail, Plain 25%
Wrought Bracket, 1 3-16 in. .... ₱ ft. 3¢
Wrought Bracket, 1¼ x 5-16 .. ₱ ft. 7¢
Swett's Hylo, ₱ ft. 11¢ 60%
P. L. B. Steel Rail ..... ₱ 100 ft. $3.00
No. 0, 1 x 3-16 ..... ₱ 100 ft. $3.00

Rakes—
NOTE.—Many goods are sold at net prices.
Fort Madison Red Head Lawn $3.25
Fort Madison Blue Head Lawn $2.70
Jackson Lawn, 29 and 30 teeth, ₱ doz., net $4.25
Cronk's:
New Champion Garden, ₱ doz., 12 teeth, $15.00; 14, $16.50; 16, $18.00.. 75%
Victor Garden, ₱ doz., 12 teeth, $15.00; 14, $16.50; 16, $18.00 ..... 60%
Queen City Lawn, ₱ doz., 29 teeth, $2.85; 24, $3.00 ..... net
Anticlog Lawn, ₱ doz. $1.00
Malleable Garden ..... 70&10%
Ideal Steel Garden, ₱ doz., 12 teeth, $15.00; 14, $16.00; 16, $18.00 ..... 60%
Kohler's:
Lawn Queen, 20-tooth .... ₱ doz. $2.90
Lawn Queen, 24-tooth .... ₱ doz. $3.00
Paragon, 20-tooth ..... ₱ doz. $2.70
Paragon, 24-tooth ..... ₱ doz. $2.75
Steel Garden, 14-tooth .... ₱ doz. $2.40
Malleable Garden, 14-tooth, ₱ doz. $1.75@2.00

Rasps, Horse—
Disston's 75%
Heller Bros. ..... 70&5@70&10&5%
Kohler Bros.' Gold Medal .. 70&10@75%
New Nicholson ..... 70&10@75%
See also Files.

Razors—
Liana Ro-ras-ic 60%
Fox Razors, ₱ doz., No. 42, $20.00; No. 44, $20.00; No. 82, Platina, $25.00. } Dis. 40%
Red Devil 50%
Silberstein:
Carbo Magnetic, $21.00; Griffon, No. 65, $13.50; Griffon, No. 00, $12.00; all other Razors, 40%.

Safety Razors—
Kampfe Bros.:
Star Safety, 25%; Star Interchangeable, 25%; Star Safety Corn, 25%.
Silberstein 40%

Reels, Fishing—
Hendryx:
M 6, Q 6, A 6, B 6, M 9½, M 16, Q 16, A 16, B 16, 4008, Rubber, Populo, Nickeled Populo 20%
Aluminum, German Silv., Bronze .. 25%
1240 N, 124 N 20%
3004 N, 66 N, 6 RM, G 9 ..... 25%
4 N, 6 PN, 24 N, 26 PN 20%
2904 P., 33½%; 2904 PN., 33½%; 0024 N., 33½%; 02084 N., 33½%; 002904 PN., 33½%; 802 N., 33½%.
986 PN, 2904 N, 974 PN 25%
5009 PN, 5009 N 20%
Competitor, 102 P, 102 PN, 202 P, 202 PN, 102 PR, 202 PR 20%
304 P, 304 PN, 00304 P, 00304 PN .. 33⅓%

Registers—*List July 1, 1903.*
Japanned, Electroplated and Bronzed 70%
White Porcelain Enamel 60%
Solid Brass or Bronze Metal, 40&10%

Revolvers—
Single Action ..... 95¢@$1.00
Double Action, except 44 cal. $1.85
Double Action, 44 caliber $2.00
Automatic $3.25
Hammerless $3.75

Riddles, Hardware Grade
16 in. ..... *per doz. $2.50@$2.75*
17 in. ..... *per doz. $2.75@$3.00*
18 in. ..... *per doz. $3.00@$3.25*

Rings and Ringers—
Bull Rings—

	2	2½	3 inch.
Steel	$0.70	0.75	0.80 doz.
Copper	$1.00	1.15	1.40 doz.

Rea's Improved Self-Piercing, ₱ doz., Copper, 2 in., $1.25; 2½ in., $1.50; 3 in., $1.75.

Hog Rings and Ringers—
Hill's Rings, gro. boxes $4.00@$4.50
Hill's Ringers, Gray Iron ..... *doz. 50@55¢*
Hill's Ringers, Malleable Iron .. *doz. 70@75¢*
Blair's Rings ... *per gro. $4.75@5.25*
Blair's Ringers. per doz. $0.60@ .65
Brown's Rings .. *per gro. $5.00@5.50*
Brown's Ringers. per doz. $0.60@ .65

Rivets and Burrs—
Copper ..... 40@42½%
Carriage, Coopers', Tinners, &c.:
Black ..... 70&10%
Metallic Tinned 70%

Bifurcated and Tubular—
Assorted in Boxes.
Bifurcated, per doz. boxes, pasteboard boxes, 23@25¢; Tin boxes, 29@32¢.
Tubular, per doz. boxes, 50 count, 29@32¢; 100 count, 51@58¢.

Rollers—
Acme, Stowell's Anti-Friction 50%
Cronk's Stay No. 65, $0.90; No. 50 ..... $1.00
Cronk's Brinkerhoff No. 55, $0.60; No. 56 ..... $0.84
Lane's Stay 40%
Richards' Stay:
Handy Adj. and Reversible No. 53 .. 75¢
O. K. Adj. and Reversible No. 58 .. 50¢
Lag Screw, Nos. 55 and 57 ..... 50%
Underwriters', Nos. 59, 60 ..... 50%
Favorite, No. 54 ..... 60%
Stowell's Barn Door Stay .. ₱ doz. $1.00
Swett's Anti-Friction 50%
Screw and Spike Stay ..... ₱ doz. 65¢
Hinge Adjustable Stay ..... ₱ doz. 90¢

Rope—
Manila, 7-16 in. diam. and larger:
Pure ..... *lb., 12½@13¢*
Sisal, 7-16 in. diam. and larger:
Pure ..... *lb., 9½¢*
Sisal, 7-16 in. diam. and larger:
No. 2 quality ..... *lb., 8¢*
Sisal, Hay, Hide and Bale Ropes, Medium and Coarse:
Mixed ..... *lb., 8¢*
Pure ..... *lb., 9½¢*
Sisal, Tarred, Medium Lath Yarn, Coarse and Untarred:
Mixed ..... *lb., 7@7½¢*
Pure ..... *lb., 8¢*
Cotton Rope:
Best, ¼-in. and larger .. *17@18¢*
Medium, ¼-in. and larger .. *16@17¢*
Common, ¼-in. and larger .. *10¢*
In coils, ½¢ advance.
Jute Rope:
Thread, No. 1, ¼-in. & up, lb., 8½@8½¢
Thread, No. 2, ¼-in. & up, lb., 7½@8¢
Old Colony Manila Transmission Rope ..... ₱ lb 17½¢

Wire Rope—
Galvanized ..... 37½&2½%
Plain ..... 45&2½%

Ropes, Hammock—
Covert Mfg. Co.:
Jute, 35%; Sisal 30%

Rules
Boxwood ..... 60@60&10%
Ivory ..... 35&10@35&10&5%
Chapin-Stephens Co.:
Boxwood 65%
Flexifold ..... 27½&10&10%
Ivory ..... 35@35&10&10%
Miscellaneous ..... 50@50&10&10%
Stephens' Combination ..... 55@55&10%
Stationers' ..... 10@10&10%

Keuffel & Esser Co.:
Folding, Wood....35&10%
Folding, Steel....33⅓&10%
Lufkin's Steel....50&10%
Lufkin's Lumber....60%
Stanley R. & L. Co.:
Boxwood....60%
Ivory....45%
Miscellaneous....60%
Zig Zag....40%
Zig Zag, Pin Joint....42½%
Upson Nut Co.:
Boxwood....60@60&10%
Ivory....35&10@35&10&10%

Sash Balances—
See *Balance, Sash.*

Sash Locks—
See *Locks, Sash.*

Sash Weights—
See *Weights, Sash.*

Sausage Stuffers or Fillers
See *Stuffers or Fillers, Sausage.*

Saw Frames—
See *Frames, Saw.*

Saw Sets—See *Sets, Saw.*

Saw Tools—See *Tools, Saw.*

Saws—
Atkins':
Circular....50%
Band....50&10@60%
Cross Cuts....35&5%
Mulay, Mill and Drag....50%
One-Man Saw, 40%; Wood Saws, 40%; Hand, Compass, &c., 40%.
Chapin-Stephens Co.:
Turning Saws and Frames..30@30&10%
Diamond Saw & Stamping Works:
Sterling Kitchen Saws....30&10&10%
Disston's:
Circular, Solid and Ins'ted Tooth..50%
Band, 2 to 14 in. wide....60%
Band, ¼ to 1¾....60%
Crosscuts....45%
Narrow Crosscuts....50%
Mulay, Mill and Drag....50%
Framed Woodsaws....25%
Woodsaw Blades....25%
Woodsaw Rods....25%
Hand Saws, Nos. 12, 99, 9, 16, d100, D8, 120, 76, 77, 8....25%
Hand Saws, Nos. 7, 107, 107½, 3, 1, 0, 00, Combination....30%
Compass, Key Hole, &c....25%
Butcher Saws and Blades....30%
C. E. Jennings & Co.'s:
Back Saws....25%
Butcher Saws....30%
Compass and Key Hole Saws..35&5%
Framed Wood Saws....30%
Hand Saws....20&2½%
Wood Saw Blades....35%
Millers Falls:
Butcher Saws....15&10%
Star Saw Blades....15&10%
Massachusetts Saw Works:
Victor Kitchen Saws....40&10&50%
Butcher Saws Blades....35@40%
Peace & Richardson's Hand Saws...30%
Simonds':
Circular Saws....50%
Crescent Ground Cross Cut Saws..35%
One-Man Cross Cuts....40&10%
Gang Mill, Mulay and Drag Saws..50%
Band Saws....50%
Hack Saws....25@25&7½%
Butcher Saws....35@35&7½%
Hand Saws....25@25&7½%
Hand Saws, Bay State Brand....45%
Compass, Key Hole, &c..25@25&7½%
Wood Saws....40&7½%
Wheeler, Madden & Clemson Mfg. Co.'s Cross Cut Saws....50%

Hack Saw Blades and Frames—
Atkins' Hack Saw Blades A A A..35%
Disston's:
Concave Blades....25%
Keystone Blades....35%
Hack Saw Frames....30%
Fitchburg File Works, The Best...35%
C. E. Jennings & Co.'s:
Hack Saw Frames, Nos. 175, 180....40&7½%
Hack Saws, Nos. 175, 180, complete, 40&7½%
Goodell's Hack Saw Blades....40&10%
Griffin's Hack Saw Frames..35&5&10%
Griffin's Hack Saw Blades....35&5&10%
Star Hack Saws and Blades....15&10%
Sterling Hack Saw Blades....30&10&5%
Sterling Hack Saw Frames..30&10&10%
Sterling Power Hack Saw Machines, each, No. 1, $25.00; No. 2, $30.00..10%
Victor Hack Saw Blades....25%
Victor Hack Saw Frames....40%

Scroll—
Barnes, No. 7, $15....25%
Barnes' Scroll Saw Blades....40%
Barnes' Velocipede Power Scroll Saw, without boring attachment, $18; with boring attachment, $20....20%
Lester, complete, $10.00....15&10%
Rogers, complete, $3.50 and $4.00....15&10%

Scales—
Family, Turnbull's....50@50&10%
Counter:
Hatch, Platform, ½ oz. to ¼ lbs....doz. $5.50
Two Platforms, ¼ oz. to 8 lbs....doz. $16.00
Union Platform, Plain.$1.70@1.90
Union Platform, Stpd.$1.85@2.15
Chatillon's:
Eureka....25%
Favorite....40%
Crocers' Trip Scales....40%
Chicago Scale Co.:
The Little Detective....25 lbs 50%
Union or Family No. 2....40%
Portable Platform (reduced list)..50%
Wagon or Stock (reduced list)..25@25%
The Standard Portables....45%
The Standard R. R. and Wagon....50&10%

Scrapers—
Box, 1 Handle....doz. $2.00@2.25
Box, 2 Handle....doz. $2.50@2.80
Ship....Light, $2.00; Heavy, $3.50
Adjustable Box Scraper (S. R. & T. Co.), $6.00....48%
Chapin-Stephens Co., Box...30@30&10%

Screws—Bench and Hand
Bench, Iron, doz., 1 in., $2.50@2.75; 1⅛, $3.00@3.25; 1¼, $3.50@3.75
Bench Wood....25@25&5%
Hand, Wood....25@25&5%
R. Bliss Mfg. Co., Hand..20&5@20&10%
Chapin-Stephens Co., Hand....25%

Coach, Lag and Hand Rail—
Lag, Cone Point, list Oct. 1, '99....75&15%
Coach, Gimlet Point, list Oct. 1, '99....75&10%
Hand Rail, list Jan. 1, '81....70&10@75%

Jack Screws—
Standard List....75%
Millers Falls....50&10&10%
P., S. & W....50%
Swett Iron Works....75@80%

Machine—
List Jan. 1, '98:
Flat or Round Head, Iron....50@50&10%
Flat or Round Head, Brass....50@50&10%

Set and Cap—
Set (Iron)....75&10&7½%
Set (Steel), net advance over Iron....25%
Sq. Hd. Cap....70&10&7½%
Hex. Hd. Cap....70&10&7½%
Rd. Hd. Cap....50&7½%
Fillister Hd. Cap....60&7½%

Wood—
List July 23, 1903.
Flat Head, Iron....87½&10@..%
Round Head, Iron...85 &10@..%
Flat Head, Brass....82½&10%
Round Head, Brass..80 &10@..%
Flat Head, Bronze...77½&10@..%
Round Head, Bronze.75 &10@..%
Drive Screws....87½&10%

Scroll Saws—
See *Saws, Scroll.*

Scythes—
	Per doz.
Grass, No. 1, Plain	$6.25@6.75
Clipper, Bronzed Webb	$6.50@7.00
No. 3 Clipper, Pol'd Webb	$6.75@7.25
No. 6 Clipper and Solid Stee.,	$7.00@7.50
Bush, Weed and Bramble, No. 2	$6.50@7.00
Grain, No. 1	$8.25@8.75
Bronzed Webb, No. 1	$8.50@9.00
Nos. 3 and 4 Clipper, Grain	$8.75@9.25
Solid Steel, No. 6	$9.25@9.75

Seeders, Raisin—
Enterprise....25@30%

Sets—Awl and Tool—
Fray's Adj. Tool Handles, Nos. 1, $12; 2, $18; 3, $12; 4, $9; 5, $7....50%
C. E. Jennings & Co.'s Model Tool Holders....30%
Millers Falls Adj. Tool Handles, No. 1, $12; No. 4, $12; No. 5, $18....15&10%

Garden Tool Sets—
Ft. Madison Three Plows, Hoe, Rake and Shovel....℔ doz sets $9.00

Sets, Nail—
Octagon....gro. $3.50@3.75
Buck Bros....37½%
Cannon's Diamond Point, ℔ gro.$12.40%
Mayhew's....℔ gro. $9.90
Snell's Cor'gated, Cup Pt....℔ gro. $7.20
Snell's Knurled, Cup Pt....℔ gro. $7.20
Victor Knurled Cup Pt....℔ gro. $7.50

Rivet—
Regular list....75@75&10%

Saw—
Atkin's:
Criterion....40%
Adjustable....40%
Disston's Star, Monarch and Triumph....30%
Morrill's No. 1....$15.00 } net
Nos. 3 and 4, Cross Cut....$20.60 } net
No. 5, Mill....$30.00 } net
Nos. 10, 11, 95....$15.60 } 50
No. 1 Old Style....$10.00 } 50
Special....$16.25 } 50
Giant Royal Cross Cut....℔ doz. $8.00
Royal, Hand....℔ doz. $4.50
Taintor Positive....℔ doz. $6.75

Shaving—
Fox Shaving Sets, No. 20....℔ doz., net, $24.00
Smith & Hemenway Co.'s....60%

Sharpeners, Knife—
Chicago Wheel & Mfg. Co....70%
Pike Mfg. Co.:
Fast Cut Pocket Knife Hones, ℔ doz....$1.50 } 50
Mounted Kitchen Sand Stone, ℔ doz....$1.50 } 50
Natural Grit Carving Knife Hones, ℔ doz....$3.00 } 50
Quick Cut Emery Carving Knife Hones, ℔ doz....$1.50 } 50
Quick Edge Pocket Knife Hones, ℔ doz....$2.50 } 50

Skate—
Smith & Hemenway Co., Eureka..20%

Shaves, Spoke—
Iron....doz.$1.10@1.25
Wood....doz.$1.75@2.25
Bailey's (Stanley R. & L. Co.)....45%
Razor Edge (Stanley R. & L. Co.) Iron, 50%; Wood....55%
Chapin-Stephens Co....30@30&10&10%
Goodell's ℔ doz. $9.00....15&10%
Wood's F1 and F2....50%

Shears—
Cast Iron..	*7*	*8*	*9 in.*
Best	*$16.00*	*18.00*	*20.00 gro.*
Good	*$13.00*	*15.00*	*17.00 gro.*
Cheap	*$5.00*	*6.00*	*7.00 gro.*

Straight Trimmers, &c.:
Best quality Jap....70@70&10%
Best quality, Nickel..60@60&10%
Fair quality, Jap....80@80&5%
Fair quality, Nickel..75@"&10%
Tailors' Shears....40@40&10%
Acme Cast Shears....40@ 10&5%
Heinisch's Tailor's Shears....10%
Wilkinson Shear & Cutlery Co.:
Sheep, 1900 list....30&10&5%
Grass....50&10%
Horse or Mule....50&10%

Tinners' Snips—
Steel Blades....20&5@20&10%
Steel Laid Blades....40&10@50%
Forged Handles, Steel Blades, Berlin....50%
Heinisch's Snips....40%
Jennings & Griffin Mfg. Co.'s, 6½ to 10 in....50%
Niagara Snips....40%
P., S. & W. Forged Handles....20%

Pruning Shears—
Cronk's Hand Shears....33⅓%
Cronk's Wood Handle Shears....33⅓%
Disston's Combined Pruning Hook and Saw, ℔ doz. $18.00....25%
Disston's Pruning Hook only, ℔ doz. $12.00....25%
John T. Henry Mfg. Co.:
Pruning Shears, all grades....50%
P., S. & W. Co....30%
Wilkinson Shear & Cutlery Co.:
Hedge, Wilcut Brand....60&10%
Lawn and Border, Wilcut Brand....60&10%

Sheaves—Sliding Door—
Stowell's Anti-Friction....50%
Reading....40%
R. & E. list....15%
Wrightsville Hatfield Pattern....80%

Sliding Shutter—
Reading list....40%
R. & E. list....10%

Shells—Shells, Empty—
Brass Shells, Empty:
Climax, 10 and 12 gauge....65&10%
Club, Rival, 65&5%; First Quality, 60&5%
Paper Shells, Empty:
New Rapid, 10, 12, 16 and 20 gauge, 25&10%
Climax, 10 and 12 gauge; Acme, 10, 12, 16 and 20 gauge; Ideal, 10, 12, 16 and 20 gauge; Leader grade, 25&5%
Union, League, 12 and 12 gauge; Rival Grade....25%
New Climax, Defiance, 10, 12, 14, 16 and 20 gauge; Climax, 14, 16 and 20 gauge....20&5%
Challenge, Monarch, 10, 12, 16 and 20 gauge; League, Union, 14, 16 and 20 gauge; Repeater Grade..20%
Expert, 10, 12, 16 and 20 gauge, 33⅓&5%
Robin Hood, Low Brass....20&5%
Robin Hood, High Brass....30&5%
Indian, for Black Powder....25&5%

Shells, Loaded—
Loaded with Black Powder..40%
Loaded with Smokeless Powder, medium grade....40&5%
Loaded with Smokeless Powder, high grade....40&10&10%
Robin Hood:
Smokeless Robin Hood, Low Brass....50%
Smokeless Comets, High Brass, 50&10&5%
Indian, Black Powder....40&5%
Winchester:
Smokeless Repeater Grade....40&5%
Smokeless Leader Grade...40&10&10%
Black Powder....40%

Shingles, Metal—Per Sq.
Edwards Mfg. Co.:

	Painted.	Galv.
14 x 20	$4.25	$6.00
10 x 14	4.50	6.25
7 x 10	4.75	6.50

Wheeling Corrugating Co.:

	Tin Painted,	Galv.
Dixie, 14 x 20 in.	$4.25	$5.50
Dixie, 10 x 14 in.	4.50	6.00
Dixie, 7 x 10 in.	5.00	6.75

Shoes, Horse, Mule, &c.—
F.o.b. Pittsburgh:
Iron....per keg $4.00
Steel....per keg $3.75
Burden's, all sizes....℔ keg $3.90

Shot—
25-lb. bag.
Drop, up to B....$1.90
Drop, B and larger....2.15
Buck....2.15
Chilled....2.15
Dust....2.35

Shovels and Spades—
Association List, Nov. 15, 1902..40%

Snow Shovels—
Long Handle....$2.75@$3.00
Wood and Malt. D. Handle, $3.25@$3.50

Sieves and Sifters—
Hunter's Imitation....gro. $9.50@10.00
Hunter's Genuine....per gro. $12.00@13.50
Buffalo Metallic Blued, R. M. Co., ℔ gr.

14&16	16&18	18&20
$13.20	$13.50	$14.40

Sieves, Seamless Metallic
—Per dozen.—

Mesh	*14*	*16*	*18*	*20*
Iron Wire	*$1.05*	*1.05*	*1.10*	*1.20*
Tinned Wire	*$1.15*	*1.15*	*1.20*	*1.30*

Sieves, Wooden Rim—
Nested, 10, 11 and 12 Inch.
Mesh 18, Nested....doz. $0.90@0.95
Mesh 20, Nested....doz. $1.00@1.05
Mesh 24, Nested....doz. $1.30@1.40

Sinks, Cast Iron—
Painted, Standard List:
12 x 12 to 22 x 36 in....60%
20 x 40 to 24 x 50 in....50%
24 x 60 to 24 x 120 in....30%
Barnes' low list:
Up to and including 20 x 36 in.50&5%
20 x 40 to 24 x 50 in....50%
NOTE.—There is not entire uniformity in lists used by jobbers.

Skeins, Wagon—
Cast Iron....70@75&10%
Steel....40@45%

Slates, School—
Factory Shipments.
"D" Slates....50@50&10%
Eureka, Unexcelled Noiseless..60&5 tens
Victor A, Noiseless.60&4 tens &5%

Slaw Cutters—See *Cutters.*

Snaps, Harness—
German....40@40&10%
Covert Mfg. Co.:
Derby, 25%; Yankee, 30&2%; Yankee Roller, 30&2%
High Grade, 40%; Trojan....40%
Jockey....25%
Oneida Community:
Harness Snaps, 1 inch....60&5%
Swivel Snaps....60%
Swivels....50%

Snaths—
Scythe....50%

Snips, Tinners—See *Shears.*

Spoons and Forks—
Silver Plated—
Good Quality....50&10@60&5%
Cheap....60@60&10%
International Silver Co.:
1847 Rogers Bros., 40&10%; Rogers & Hamilton....50&10%
Rogers & Bro., William Rogers' Eagle Brand....50&10%
Anchor, Rogers Brand....60%
Wm. Rogers & Son....60&10%

Miscellaneous—
German Silver....60@60&5%
Cattaraugus Cutlery Co.:
Seneca Silver....50%

Tinned Iron—
Teas....per gro. 45@50¢
Tables....per gro. $0.50@$1.00

Springs—Door—
Bardaley's Spring and Check....40%
Chicago (Coil)....40&10%
Gem (Coil)....20%
Pullman (Coil)....35%
Reliance (Coil)....40&10%
Star (Coil)....30%
Torrey's Rod, 39 in....℔ doz. $1.10

Carriage, Wagon, &c.—
1¼ in. and Wider:	*Per lb.*
Black	*4@4¼¢*
Half Bright	*4@4¼¢*
Bright	*4½@4¾¢*

Painted Seat Springs:
1½ x 2 x 26....per pr. 42¢
1½ x 3 x 28....per pr. 70¢

Sprinklers, Lawn—
Enterprise....25@30%
Philadelphia No. 1, ℔ doz. $12; No. 2, $15; No. 3, $20....30%
Pleuger & Henger Mfg. Co.:
Cactus, 65&5%; Japanese, 70&5%; Nationals, 60&5%.

Squares—
Nickel plated.. } *List Jan. 5, 1900.*
Steel and Iron.. } 75@—%
Rosewood Hdl. Try Square and T-Bevels....60&10&10@70%
Iron Hdl. Try Squares and T-Bevels....40&10@40&10&10%
Disston's Try Squares and Bevels, Rosewood Handle, 67½%; Iron Stock and Bevel....20%
Winterbottom's Try and Miter, No. 1, 35%; No. 2....45%

Squeezers, Lemon
Wood, Common, gro., No. 0, $5.25@$5.50; No. 1, $6.25@$6.50.
Wood, Porcelain Lined:
Cheap....doz. $1.00
Good Grade....doz. $1.25
Tinned Iron....doz. $0.75@1.25
Iron, Porcelain Lined...doz. $1.75

Staples—
Barbed Blind....lb. 4@4¼¢
Electricians', Association list..80&10&10&10%
Fence Staples, Plain, $2.25; Galvanized....$2.55
Poultry Netting Staples....per lb. 3¼@3½¢

Steels, Butchers'—
Dick's....30%
Foster Bros....30%
C. & A. Hoffmann's....40%

Steelyards—....30@30&10%

Stocks and Dies—
Blacksmiths'....50@50&10%
Curtis Rev'ble Ratchet Die Stock..25%
Derby Screw Plates....25%
Green River....25%
Lightning Screw Plate....25%
Little Giant....25%
Reece's New Screw Plates....25%

Stoners, Cherry—
Enterprise....25@30%

Stones—Oil, &c.
Chicago Wheel & Mfg. Co., 1904 list:
Gem Corundum Oil, Double Grit..60%
Gem Corundum Axe, Single or Double Grit....60%
Gem Corundum Slips....60%
Gem Corundum Razor Hones....50%
Pike Mfg. Co., 1904 list: ℔ lb.
Arkansas St. No. 1, 3 to 5¼ in....$2.00 } 25&5
Arkansas St. No. 1, 5½ to 8 in.$3.50 } 25&5
Arkansas Slips No. 1....$4.00 } 25&5
Lily White Washita, 4 to 8 in.60¢ } 25&5
Rosy Red Washita, 4 to 8 in..60¢ } 25&5
Washita St., Extra, 2 to 8 in.50¢ } 25&5
Washita St., No. 1, 4 to 8 in.40¢ } 25&5
Washita St., No. 2, 4 to 8 in.30¢ } 25&5
Lily White Slips....90¢ } 25&5
Rosy Red Slips....90¢ } 25&5
Washita Slips, Extra....80¢ } 25&5
Washita Slips, No. 1....70¢ } 25&5
Washita Slips, No. 2....40¢ } 25&5
India Oil Stones (entire list)....33⅓%
Quickcut Emery and Corundum Oil Stone, Double Grit....33⅓%
Quickcut Emery and Corundum Axe Stone, Double Grit....33⅓%
Quickcut Emery Rubbing Bricks 33⅓%
Hindostan No. 1, R'g'lar, ℔ lb. 8¢ } 25&5
Hindostan No. 1, Small..℔ lb 10¢ } 25&5
Axe Stones (all kinds)....
Turkey Oil Stones, Extra, 5 to 8 in....℔ lb 80¢ } 25&5
Queer Creek Stones, 4 to 8 in.20¢ } 25&5
Queer Creek Slips....40¢ } 25&5
Sand Stone....6¢ } 25&5

Scythe Stones—

Chicago Wheel & Mfg. Co.:
Gem Corundum, 10 in., $8.00 ℔ gro., 12 in., $10.80.
Norton Alundum Scythe Stones:
Less than 10 gross lots... ℔ gro. $6.00
Lots of 10 gross or more...℔ gro. $4.50
Pike Mfg. Co., 1901 list:
Black Diamond S. S..℔ gro. $12.00
Lamoille S. S.....℔ gro. $11.00
White Mountain S. S.℔ gro. $9.00
Green Mountain S. S.℔ gro. $6.00
Extra Indian Pond S.S.℔ gro. $7.50
No. 1 Indian Pond S.S.℔ gro. $7.00
No. 2 Indian Pond S.S.℔ gro. $4.50
Leader Red End S. S.℔ gro. $4.50
Quick Cut Emery....℔ gro. $10.00
Pure Corundum,....℔ gro. $18.00
Crescent $7.00
Emery Scythe Rifles, 2 Coat, $8
Emery Scythe Rifles, 3 Coat, $10
Emery Scythe Rifles, 4 Coat, $12
Balance of 1904 list 33⅓%

Stoppers, Bottle—

Victor Bottle Stoppers.....℔ gro. $9.00

Stops— Bench—

Millers Falls.....15&10%
Morrill's, ℔ doz., No. 1, $10.00.....50%
Morrill's, No. 2, $12.50.....50%

Door—

Chapin-Stephens Co.....40@60&10%

Plane—

Chapin-Stephens Co.....20%

Straps— Box—

Cary's Universal, case lots....20&10&10%

Stretchers, Carpet—

Cast Iron, Steel Points, doz. 60@60&10%
Socket .....doz. $1.60
Bullard, ℔ doz.....$4.00
Excelsior Stretcher and Tack Hammer Combined, ℔ doz. $6.00.....20%

Strops, Razor—

Star Diagonal Strop.....25%

Stuffers, Sausage—

Enterprise Mfg. Co.....25@25&7½%
National Specialty Co., list Jan. 1, 1902 .....30&5%

Sweepers, Carpet—

National Sweeper Co.: ℔ doz.
Louis XV, Roller Bearing, Gold Plated $120.00
Hepplewhite, Roller Bearing, Silver Plated.....$72.00
Sheraton, Roller Bearing, N'kel.$60.00
Ye Mission, Roller Bearing, Oxidized Coppered.....$36.00
Transparent, Roller Bearing, Plate Glass top, Nickeled.....$36.00
National Queen, Roller Bearing, Fancy Veneers.....$27.00
Loyal, Roller Bearing, Veneers, Nickeled $25.00
Triple Medal, Roller Bearing, Nickeled $24.00
Marion, Roller Bearing, N'kel.$24.00
Marion Queen, Roller Bearing, Nickeled $24.00
Monarch, Roller Bearing, N'kel.$22.00
Monarch, Roller Bearing, Jap..$20.00
Perpetual, Regular B'r'gs, N'kel.$20.00
Perpetual, Regular B'r'gs, Jap..$18.00
Monarch Extra (17 in. case), Roller Bearing, Nickeled.....$36.00
Monarch Extra (17 in. case), Roller Bearing, Japanned.....$33.00
Auditorium (26 in. case), Roller Bearing, Nickeled.....$54.00
Mammoth (30 in. case), Roller Bearing, Nickeled.....$60.00

NOTE.—Rebates: 50c per dozen on three-dozen lots; $1 per dozen on five-dozen lots; $2 per dozen on ten-dozen lots; $2.50 per dozen on twenty-five-dozen lots.

Streator Metal Stamping Co.:
Eureka Japanned.....℔ doz. $15.00
Model E, Sanitaire.....℔ doz $25.00
Model A, Sterling.....℔ doz. $25.00
Model B, Sterling, Nickeled..... ℔ doz. $23.00
Model B, Sterling, Japanned..... ℔ doz. $21.00
Model C, Sterling.....℔ doz. $21.50
Model D, Sterling.....℔ doz. $19.50

Tacks, Finishing Nails, &c.

New List, May 1, 1905.
American Carpet Tacks..90&35%
American Cut Tacks.....90&35%
Swedes Cut Tacks..90&37½@—%
Swedes Upholsterers'.....90&35%
Gimp Tacks.....90&45@—%
Lace Tacks.....90&55@—%
Trimmers' Tacks.....90&35%
Looking Glass Tacks....65@—%
Bill Posters' and Railroad Tacks, 90&45@—%
Hungarian Nails.....80&20@—%
Finishing Nails.....70@—%
Trunk and Clout Nails..80@—%

NOTE.—The above prices are for Standard Weights. An extra 5% is given on Medium Weights, and an extra 10&5% is given on light weights.

Miscellaneous—

Double Pointed Tacks..... 90&4½ or 5 tens
See also Nails, Wire.

Tanks, Oil—

	Each.
Emerald, R. M. Co.	30-gal. $3.40
Emerald, R. M. Co.	60-gal. $4.25
Queen City, R. M. Co.	30-gal. $3.65
Queen City, R. M. Co.	60-gal. $4.50

Tapes, Measuring—

American Asses' Skin ..50@—%
Patent Leather.....25@30&5%
Steel .....33 1-3&5%
Chesterman's .....25@25&5%
Keuffel & Esser Co.:
Favorite, Ass Skin.....40&10@58%
Favorite, Duck and Leather..... 25&5@25&10%
Metallic and Steel, lower list, 35@35&5%; Pocket, 35@35&5%.
Lufkin's:
Asses' Skin.....40&10@50%
Metallic .....30@30&5%
Patent Bend, Leather....25&5@25&10%
Pocket .....40@40&5%
Steel .....33⅓@35%
Wiebusch & Hilger:
Chesterman's Metallic, No. 34L, etc. 25%
Chesterman's Steel, No. 1038L, etc. 35%

Teeth, Harrow—

Steel Harrow Teeth, plain or headed, ⅝-inch and larger... per 100 lbs. $2.75@$3.00

Thermometers—

Tin Case.....80&10@80&10&5%

Ties, Bale—Steel Wire—

Single Loop.....60&2½%
Monitor, Cross Head, &c....70%

Brick Ties—

Niagara Brick Ties.....25&10%

Tinners' Shears, &c.—

See *Shears, Tinners', &c.*

Tinware—

Stamped, Japanned and Pieced, sold very generally at net prices.

Tire Benders, Upsetters, &c.

See *Benders and Upsetters, Tire.*

Tools—Coopers'—

L. & I. J. White.....20@20&5%

Hay—

Myers' Hay Tools.....50%
Stowell's Hay Carriers, 50%; Hay Forks, 50%; Fork Pulleys, 50%.

Miniature—

Smith & Hemenway Co.'s, Davidson 25%

Saw—

Atkins' Cross Cut Saw Tools.....40%
Simonds' Improved.....33⅓%
Simonds' Crescent.....25%

Ship—

L. & I. J. White.....25%

Transom Lifters—

See *Lifters, Transom.*

Traps—Fly—

Balloon, Globe or Acme, doz. $1.15@$1.25; gro.....$11.50@12.00
Harper, Champion or Paragon, doz. $1.25@1.40; gro. $13.00@13.50

Game—

Imitation Oneida.....75@75&5%
Newhouse .....45@45&5%
Hawley & Norton.....65%
Victor .....70&10%
Oneida Community Jump.....50%

Mouse and Rat—

Mouse, Wood, Choker, doz. holes 8½@9¢
Mouse, Round or Square Wire, doz. 85@90¢
Marty French Rat and Mouse Traps (Genuine):
No. 1, Rat, ℔ doz., $13.25; case of 24 .....$11.50 doz.
No. 3, Rat, ℔ doz., $6.50; case of 50 .....$5.75 doz.
No. 3½, Rat, ℔ doz. $5.25; case of 72 .....$4.70 doz.
No. 4, Mouse, ℔ doz. $3.85; case of 150 .....$3.00 doz.
No. 5, Mouse, ℔ doz. $3.00; case of 150 .....$2.25 doz.

Trimmers, Spoke—

Wood's E I.....50%

Trowels—

Disston Brick and Pointing.....25%
Disston Plastering.....20%
Disston "Standard Brand" and Garden Trowels.....30%
Kohler's Steel Garden Trowels, ℔ gro., 5 in., $4.80; 6 in., $6.00.
Never-Break Steel Garden Trowels.. ℔ gro. $6.00
Rose Brick and Plastering.....25&5%
Woodrough & McParlin, Plastering.25%

Trucks, Warehouse, &c.—

B. & L. Block Co.:
New York Pattern.....50&10%
Western Pattern.....60&10%
Handy Trucks.....℔ doz. $16.00
Grocery .....℔ doz. $15.00
Daisy Stove Trucks, Improved Pattern .....℔ doz. $18.50
McKinney Trucks.....each $10.00
Model Stove Trucks.....℔ doz. $18.50

Tubs, Wash—*No. 1 2 3*

Galvanized, per doz. $4.25 4.75 5.25
Galvanized Wash Tubs (R. M. Co.):
No. 1 2 3 10 20 30
Per doz., net.$5.70 6.30 7.20 6.60 7.20 8.10

Twine, Miscellaneous—

Flax Twine:
No. 9, ¼ and ½-lb. Balls..22@24¢
No. 12, ¼ and ½-lb. Balls..20@21¢
No. 18, ¼ and ½-lb. Balls..17@19¢
No. 24, ¼ and ½-lb. Balls..16@18¢
No. 36, ¼ and ½-lb. Balls..15@17¢
Chalk Line, Cotton ½-lb. Balls .....25@30¢
Cotton Mops, 6, 9, 12 and 15 lb. to doz.....10@18¢
Cotton Wrapping, 5 Balls to lb., according to quality...14½@22¢
American 2-Ply Hemp, ¼ and ½-lb. Balls.....13½@14½¢
American 3-Ply Hemp, 1-lb. Balls .....14½@15½¢
India 2-Ply Hemp, ¼ and ½-lb. Balls (Spring Twine) .9½@10½¢
India 3-Ply Hemp, 1-lb. Balls 9½@10½¢
India 3-Ply Hemp, 1½-lb. Balls. 9@10¢
2, 3, 4 and 5-Ply Jute, ½-lb. Balls .....11@13¢
Mason Line, Linen, ½-lb. Bls. 46¢
No. 26½ Mattress, ½ and ¼-lb. Balls, according to quality, 30@60¢
Wool, 3 to 6 ply... B 7½¢; A 9¢

Vises—

Solid Box.....60%

Parallel—

Athol Machine Co.:
Simpson's Adjustable.....40%
Standard 40%
Amateur 25%
Columbian Hdw. Co.....40%
Emmert Universal:
Pattern Makers' No. 1, $15.00; No. 2, $12.50.
Machinist and Tool Makers' No. 4A, $12.50; No. 6A, $10.00; No. 10A, $22.50.
Presto Quick Acting Adjustable Jaw, 25@25&10%; Solid Jaw, 35@35&10%
Tiger Machinists'.....40%
Fisher & Norris Double Screw, net, each, Nos. 2, $10.50; 3, $16.00; 4, $20.50; 5, $27.00.
Hollands':
Machinists' .....40@43&5%
Keystone .....65&5&10%
Lewis Tool Co.:
Adjustable Jaw.....30%
Monarch, 50%; Solid Jaw.....50%
Massey Vise Co.:
Clincher 40%
Perfect, 15%; Lightning Grip....15%
Merrill's 20%
Millers Falls Oval Slide Pattern.60&10%
Parker's:
Victor, 20@25%; Regulars.....20@25%
Vulcan's .....40@45%
Combination Pipe.....55@60%
Prentiss .....20@25%
Snediker's X. L.....33⅓%
Stephens' 33⅓%

Saw Filers—

Disston's D 3 Clamp and Guide, ℔ doz., $24.00, 30%; Clamps.....30%
Perfection Saw Clamps, ℔ doz....$4.50
Reading 60%
Wentworth's Rubber Jaw, Nos. 1, 2 and 3.....50%

Wood Workers—

Massey Vise Co.:
Lightning Grip, 15%; Perfect.....15%
Wyman & Gordon's Quick Action, 6 in., $6.00; 9 in., $7.00; 14 in., $8.00.

Miscellaneous—

Holland's Combination Pipe..60@60&5%
Massey's Quick Action Pipe.....40%
Parker's Combination Pipe:
87 Series, 60%; 187 Series, 60&5%; No. 870, 40%.

Wads—*Price per M.*

B. E., 11 up.....60¢
B. E., 9 and 10.....70¢
B. E., 8.....80¢
B. E., 7.....80¢
P. E., 11 up.....$1.00
P. E., 9 and 10..... 1.25
P. E., 8..... 1.50
P. E., 7..... 1.50
Dis. 15%
Ely's B. E., 11 and larger.$1.70@1.75
Ely's P. E., 12 to 20....$3.00@3.25

Ware, Hollow—
Cast Iron, Hollow—

Stove Hollow Ware:
Enameled .....45&10@50%
Ground .....50@50&10%
Plain or Unground...60@60&5%
Country Hollow Ware, per 100 lbs. $2.75
White Enameled Ware:
Maslin Kettles.....65@65&10%
Covered Wares:
Tinned and Turned.....35&10%
Enameled .....45&10%
See also *Pots, Glue.*

Enameled—

Agate Nickel Steel Ware.....60%
Iron Clad Ware.....70&10%
Lava, Enameled.....40&10%
Never Break Enameled.....50%

Tea Kettles—

Galvanized Tea Kettles:

Inch..	*6*	*7*	*8*	*9*
Each	*45¢*	*50¢*	*55¢*	*65¢*

Steel Hollow Ware—

Avery Spiders and Griddles..65@65&5%
Avery Kettles.....60%
Porcelained .....50&5&50&10%
Never Break Spiders and Griddles..... 65&5%
Never Break Kettles.....60%
Solid Steel Spiders and Griddles.65&5%
Solid Steel Kettles.....60%

Warmers, Foot—

Pike Mfg. Co., Soapstone....40@40&10%

Washboards—

Solid Zinc: ℔ doz.
Crescent, family size, bent frame.$3.70
Red Star, family size, stationary protector $3.70
Double Zinc Surface:
Saginaw Globe, family size, stationary protector.....$3.25
Cable Cross, family size, stationary protector.....$3.40
Single Zinc Surface:
Naiad, family size, open back, perforated $2.90
Single Saginaw Globe.....$2.75
Brass Surface:
Brass King, Single Surface, open back $3.65
Nickel Plate Surface:
No. 1001 Nickel Plate, Single Surface $3.65
Glass Surface:
Glass King, Single Surface, open back $3.65
Enamel Surface:
Enamel King, Single Surface, ventilated back.....$3.65

Washers—Leather, Axle—

Solid .....80&10@80&10&10%
Patent .....90@90&5%
Coil: ¼ 1 1¼ 1½ Inch.
10¢ 11¢ 12¢ 14¢ per box

Iron or Steel—

Size bolt.... 5-16 ⅜ ½ ⅝ ¾
Washers....$5.60 4.70 3.40 3.20 3.00
The above prices are based on $5.80 off list.

In lots less than one keg add ½¢ per lb.; 5-lb. boxes add ½¢ to list.

Cast Washers—

Over ½ inch, barrel lots..... per lb. 1¾@2¢

Weather Strip—
Flexible Felt—

Lined, per 100 ft., $2; $3; $4.....40&10%
Moore's Unlined, per 100 ft., $2; $3; $4 .....50&10%

Wedges—

Oil Finish.....lb. 2.70@2.80¢

Weights—Hitching—

Covert Mfg. Co.....30&2%

Sash—

Per ton, f.o.b. factory:
Eastern District...$27.50@$28.50
Southern Territory.$23.00@$24.00
Western and Central Districts .....$24.00@$27.00

Wheels, Well—

8-in., $1.55; 10-in., $2.00; 12-in., $2.50; 14-in., $4.00.

Wire and Wire Goods—

Bright and Annealed:
6 to 9.....80%
10 to 18.....80&2½%
19 to 26.....80&7½%
27 to 36.....80&2½%
Galvanized:
6 to 9.....75&5%
10 to 14.....75&7½%
15 to 16.....72½&10&2½%
19 to 26.....75%
27 to 36.....72½%
Coppered:
6 to 9.....75&5%
10 to 14.....75&7½%
15 to 18.....72½&10&2½%
19 to 26.....75&10&5%
27 to 36.....75%
Tinned:
6 to 14.....75&10&2½%
15 to 18.....75&7½%
Annealed, Steel and Tinned, on Spools .....70&10@75&10%
Brass and Copper on Spools... 60&10@65&10%
Spooled Wire, Retailers' Assortments, per box.....$2.25@$2.50
Brass .....Net list.
Cooper .....Net list.
Cast Steel Wire.....50%
Wire Clothes Line, see Lines.
Wire Picture Cord, see Cord.

Bright Wire Goods—

List June 24, '03.....90@90&10%
Brass Cup Hooks and Brass Screw Hooks.....85@—%

Wire Cloth and Netting—

Galvanized Wire Netting..... 80&5@80&10%
Painted Screen Cloth, 100 ft., $1.25
Standard Galv. Hardware Grade:
Nos. 2, 2½ & 3 Mesh, sq. ft. 3 ¢
Nos. 4 and 5 Mesh, sq. ft. 3¼ ¢
No. 6 Mesh, sq. ft.....3½ ¢
No. 8 Mesh, sq. ft.....4 ¢

Wire, Barb—See *Trade Report*

Wrenches—

Agricultural .....80@80&5%
Alligator or Crocodile..70&10@75%
Baxter Pattern S Wrenches... 70&5@70&10%
Drop Forged S.....45@45&5%
Acme .....60&10%
Alligator Pattern, 70%; Bull Dog..70%
Bemis & Call's:
Adjustable S, 40%; Adjustable S Pipe, 40%; Briggs Pattern, 40%; Combination Bright, 40%.
Steel Handle Nut.....50%
Combination Black.....40&5%
Merrick Pattern.....50%
Boardman's 40%
Coes' Genuine Knife Hdl..40&10&5&5%
Coes' Genuine Steel Hdl..40&10&5&5%
Coes' Genuine Key Model..40&10&5&5%
Coes', Genuine Hammer Handle..... 40&10&5&5%
Coes' "Mechanics'"...40&10&10&5&5%
Donohue's Engineer.....40&10%
Eagle 70%
Elgin Wrenches, ℔ doz.....$6.25
Elgin Rethreading Attachment, only with one die, ℔ doz.....$6.25
Elgin Extra Dies, ℔ doz.....$3.00
Elgin Extra Jaws, ℔ doz.....$1.75
Elgin Monkey Wrench Pipe Jaws, ℔ doz.....$2.10
Gem Pocket.....30%
Hercules 10%
W. & B. Machinist:
Case lots.....50&5%
Less than case lots.....50%
W. & B. Railroad Special:
Case lots.....30%
Less than case lots.....40&10&5%
Solid Handles, P., S. & W.....50&5%
Stillson 65%
Vulcan Chain.....50%

Fruit Jar—

Triumph Fruit Jar Wrench, 5 gross lots, ℔ gross, $7.50; ℔ doz.....$0.80

Wrought Goods—

Stables, Hooks, &c., list March 17, '92.....90@90&10%

Yokes, Ox, and Ox Bows—

Fort Madison's Farmers' & Freighters'.....list net

Zinc—

Sheet.....per 100 lb., $8.25@8.50